COMPUTERWORLD

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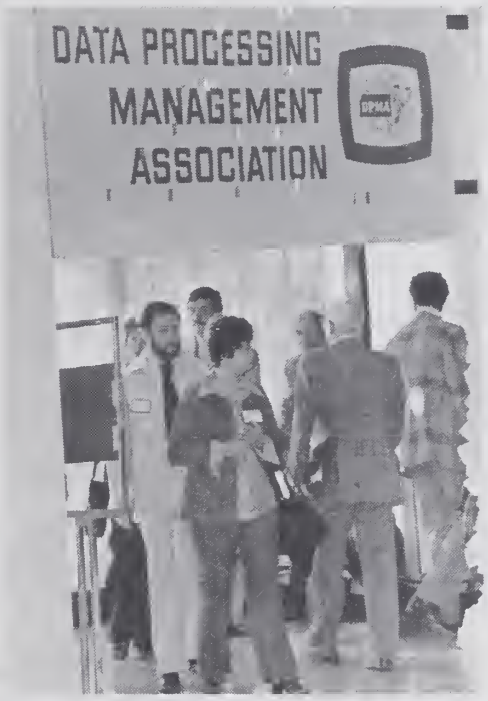
NEWSPAPER

CW Photos by J. Beeler



The exhibitors were ready and waiting as members of DPMA gathered in Washington, D.C., last week for their annual fest. Coverage of Info/-Expo '77 begins on Page 8.

New IBM Processors Flush Out Itel AS/6, But Amdahl Stands Pat

By Frank Vaughan
CW Staff

SAN FRANCISCO — Itel Corp. reacted to the recent IBM 3032 and 3031 announcement with a card it had tucked up its sleeve.

The Itel AS/6 system, introduced within six hours of the IBM announcement, has been in the works for some time and was even accidentally advertised by the firm this summer [CW, July 18].

Itel is promising first customer shipments in March, the same time deliveries of the IBM 3032 are slated to begin.

Itel is using its AS/6 to directly challenge the 3032. The unit is based on Itel's 7032 processor, which the firm claimed is 10% to 25% more powerful than the 3032.

The air-cooled AS/6 is functionally compatible with IBM 360, 370 and 3032 software, Itel said, noting processor operations are controlled through microprograms residing in reloadable control storage.

The main storage of the AS-6 is based on 4K bit/chip technology that gives 100 nsec access times on the chip level. Bus-level access times were not available.

(Continued on Page 6)

By E. Drake Lundell Jr.
CW Staff

SUNNYVALE, Calif. — Like a poker player reviewing a straight flush, Amdahl Corp. stood pat when IBM announced its 3031 and 3032 processors.

"The company has evaluated the IBM announcements and concluded the new products are replacements for the mid-range of the 370 line," Amdahl Vice-Chairman Eugene R. White said. "We see no reason to modify the existing 470 line product plan."

Amdahl has reason to be satisfied with its hand even if IBM is raising the stakes in the game (see chart on Page 4). The Amdahl 470V/6-II and V/7 clearly hold the high ground of the IBM-compatible CPU line, with both offering users more CPU power than any of the IBM 30 series entries [CW, Oct. 10].

The V/6-II is slightly more powerful than IBM's top entry, the 3033, but totes a price tag that is $105,000 less than the IBM entry.

The V/7, however, is almost 60% more powerful than the 3033 at only an additional $95,000.

While the V/6 shares the 3033's memory limitation of 8M bytes, the V/7 allows users to double that with up to 16M bytes on a system.

However, at the lower end of the line, Amdahl's V/5 does not compare so favorably with the new 3032, since it offers slightly less CPU power for a slightly higher cost.

In competition with the IBM 3031, though, the V/5 offers almost 125% the power of the IBM unit for slightly less than a 100% increase in price.

The V/5 has another advantage over its IBM counterparts — it can be field-

(Continued on Page 4)

NCIC Audit, Expansion Pending

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The Justice Department and its Federal Bureau of Investigation have officially acknowledged flaws in the National Crime Information Center (NCIC), but at the same time showed their determination to expand that system further with some type of message-switching arrangement.

At hearings here recently, representatives of both organizations told a congressional subcommittee they would welcome an on-site independent audit of the NCIC to satisfy critics such as the Scientists Institute for Public Information (Sipi) which contended that without regular auditing, security and privacy safeguards cannot be assured [CW, Sept. 12].

At the same time, Deputy Attorney General Peter F. Flaherty addressed the FBI's request to end or improve its participation in the Computerized Criminal History (CCH) portion of NCIC by directing the bureau to develop a "comprehensive blueprint for decentralizing the CCH program to participating states."

Flaherty also reiterated the Justice Department's request that the FBI be permitted to improve "the communications control capabilities needed to service all NCIC system inquiries." This request came in a letter to Rep. Don Edwards (D-Calif.), who chairs the House Judiciary Committee's Subcommittee on Civil and Constitutional Rights, the unit that conducted the hearings.

The letter, which Edwards made public at the hearing, hastened to assure that while such equipment would have the inherent capability to perform message switching, the FBI will not employ this capability until the Attorney General and Congress approve the CCH decentralization.

The hearings focused on a preliminary Sipi report that contended the NCIC has not proved its worth as a crime-fighting tool despite 10 years of operation.

In that report, the Sipi Task Force on Science and Technology sharply criticized the lack of any regular auditing of NCIC data and procedures by an independent auditing authority.

"We shall attempt to negotiate an agreement with the General Accounting Office that will result in on-site systems auditing of NCIC operations, commencing as soon as possible, for

(Continued on Page 6)

Wang, HIS Extend Options

Systems Bow

By Esther Surden
CW Staff

NEW YORK — Wang Laboratories, Inc. introduced two large-scale minicomputers last week, designed for business users with sophisticated processing needs.

Based on the 2200VS processor, also announced last week, the WCS/60 and WCS/80 systems offer virtual memory capability and can accommodate up to 512K bytes of real memory. They also feature a 32-bit word length and are programmable in Ansi 74 Cobol, RPG-

(Continued on Page 5)

Upgrade Offered

By Esther Surden
CW Staff

PHOENIX — Honeywell Information Systems, Inc. has announced a hardware/software package that reportedly allows its Series 6000 users to obtain "the functionality" of the larger Level 66 mainframes without trading in their systems.

The company also brought out enhancements for the models 6025 and 6040 that increase to 512K words the amount of memory these systems can accommodate. The Model 6060 now

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'Regulator' Patent Now Possible

High Court Refuses Patent Review

By Nancy French
CW Staff

WASHINGTON, D.C. — The Supreme Court recently refused to review a case brought by the U.S. Patent Office against a software inventor who has sought a patent for a specialized computer program for nearly five years. The high court's decision cleared the last obstacle in the way of a patent award for Glen Chatfield's "Regulator" program [CW, Dec. 13].

Regulator was designed to monitor and modify the flow of user programs in a multiprogramming environment through dynamic changes in program priority assignments.

In appealing the case to the Supreme Court, the Patent Office sought review of a decision last November in which the U.S. Court of Customs and Patent Appeals (CCPA) ruled the Regulator program, invented by Chatfield and marketed by Duquesne Systems, Inc. as part of its Quantitative Computer Management package, is eligible for protection as an invention under existing law.

Chatfield is president and part owner of Duquesne, a seven-member, Pittsburgh-based consulting firm with half a million dollars in annual revenues.

The Supreme Court denied the Patent Office's petition for a writ of certiorari on a technicality — the U.S. Solicitor General, the Patent Office's legal counsel, waited too long after the CCPA decision to file.

In his brief on behalf of the Patent Office, the Solicitor General argued the CCPA should have applied the precedent set in the Benson-Tabbot case in 1972 to the Chatfield patent claims, according to David Hanson of Webb, Burden, Robinson & Webb, Chatfield's counsel.

The CCPA, however, apparently saw a distinction between Benson-Tabbot and Chatfield. In Benson-Tabbot, the inventor was attempting to patent a method for converting one system of numbers to another, BCD to binary. This abstract mathematical method could be executed on any machine — and even with pencil and paper — for any purpose, Chatfield explained.

Chatfield's method, on the other hand, is a technique for optimizing the flow of jobs through a multiprogrammed computer. The CCPA saw this as "a unique method for improving the efficiency of a system of electromechanical machines, i.e. a computer system," according to Hanson.

The CCPA concluded that Chatfield's claimed method did not preempt mathematical formulas or algorithms even though some of his dependent claims recited algorithms, Hanson added.

The Computer and Business Equipment Manufacturers Association (Cbema) filed an amicus curiae brief in the case siding with the Commissioner of Patents and emphasizing the extremely important economic implications the case has on the entire business and technical community, according to Oliver Smoot, Cbema vice-president.

Reached after the Supreme Court made its decision, Chatfield said he interpreted the court's refusal to review the case as tacit agreement with the CCPA position, although there's no way to actually confirm that.

The Supreme Court's action leaves many other inventors like Chatfield in the position of fighting similar cases over again, Smoot said.

Perhaps the ultimate solution is a better law, Chatfield said.

The copyright — the program protection alternative currently favored by the National Commission on New Technological Uses of Copyrighted Works (Contu) is "very weak protection," according to Chatfield.

The trade secret approach, on the other hand, creates difficulties for the software vendor because computer software cannot be sold without distributing source code — which amounts to complete disclosure. This requires complicated confidentiality agreements with customers, he explained.

A patent is the best approach and is the opposite of a trade secret, Chatfield said. It requires full disclosure and gives the inventor an exclusive right to use the idea for 17 years.

"The Supreme Court's action leaves many other inventors like Chatfield in the position of fighting similar cases over again."

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(See all of ADR's new on-line products demonstrated *LIVE* at INFO 77 in New York City, October 17-20.)

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IBM, Amdahl, Itel: How They Stack Up Now

Model Characteristics	IBM 370/158-3	IBM 3031	IBM 370/168-3	Amdahl 470V/5	IBM 3032	Itel AS/6	IBM 3033	Amdahl 470V/6-II	Amdahl 470V/7
Relative CPU Power[1]	52	52	109	120	135	150	180	184	294
Purchase Price[2] (Memory in Bytes)	2,001,100 (6M)	1,455,000 (6M)	3,103,210 (6M)	2,870,000 (6M)	2,368,000 (6M)	2,360,000 (6M)	3,605,000 (6M)	3,500,000 (6M)	3,700,000 (6M)
Purchase Price[3] (No. of Channels)	2,052,865 (6)	1,455,000 (12)	4,388,460 (12)	2,870,000 (8)	2,728,000 (12)	2,660,000 (12)	3,605,000 (12)	3,500,000 (16)	3,700,000 (12)
Price/Mo[4] (Four-Year Lease)	59,600	39,310	122,629	78,925	67,470	Not Available	77,480	96,250	Not Available
Maintenance/Mo[5]	3,234	3,690	9,466	9,700	7,675	Not Available	8,320	10,200	10,200
Memory Size in Bytes (Minimum – Maximum)	512K – 6M	2M – 6M	1M – 8M	2M – 6M	2M – 6M	2M – 16M	4M – 8M	4M – 8M	4M – 16M
Memory Cycle Time (Nsec)	620 – 1,035	345 – 805	320	300	320	Not Available	290 – 464	300	280
Machine Cycle Time (Nsec)	115	115	80	32.5	80	72	58	32.5	28.5
Channels (Minimum – Maximum)	3 Standard – 6	6 Standard	0 – 12	8 Standard	6 Standard – 12	6 Standard – 16	12 Standard – 16	16 Standard	12 Standard – 16
Price/Channel	4th – 16,160 5th – 15,040 6th – 7,565	Built-In	Note 6	Built In	360,000/ 6 channels	50,000	320,000/ 4 channels[7]	Built-In	150,000/ 4 channels
Multiprocessor Configurations?	Yes	No	Yes	No	No	No	No	No	No
Buffer Size	16K	32K	32K	16K	32K	64K	64K	32K	32K

NOTES

CW Chart

1. International Data Corp. estimates based on 360/50 = 10 for all but IBM 3031, 3032, 3033 and Itel AS/6, which are CW estimates.
2. Includes CPU, power supply, operator's console and 6M-byte memory. The Amdahl systems include standard channels as do IBM 370/158-3, 3032 and 3033. The 370/168-3 includes extended channel feature (3855) but no channels.
3. All of 2 with channels added.
4. Lease rate based on purchase price in 3.
5. IBM maintenance is minimum monthly, 10 hour/day, five day/week. Amdahl maintenance is 24 hour/day, seven day/week.
6. The 2870 byte-multiplexer channel costs $117,900. The 2880 block multiplexer contains two channels for $174,500.
7. Users must add four channels; choice of four block multiplexers or three block multiplexers and one byte multiplexer.

Amdahl Unfazed By IBM Debuts

(Continued from Page 1)

upgraded to a V/6 for a purchase price of $780,000. The IBM machines have to be completely replaced.

Furthermore, the unit is air-cooled, as are all of the Amdahl processors, while the IBM 3032 is water-cooled.

Even though Amdahl did not react to the latest IBM moves at this time, industry sources indicated further pricing actions could come from IBM either late this year or next spring.

These prognosticators noted the price of memory is holding steady at around $110,000 per megabyte.

At the same time, they indicated that present industry performance shows memory price reductions should be in the offing; these would probably decrease memory to $85,000.

When that happens in the IBM line, the industry analysts predicted, Amdahl will probably adjust its memory prices to remain competitive.

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Wang Large-Scale Minis In Range of PDP-11/70

(Continued from Page 1)

II and Basic.

Designed to suit the needs of users in medium-sized companies, remote locations of larger, centralized companies and present Wang users who are reaching the limits of their systems, the WCS/60 and WCS/80 are only minimally compatible with the company's less powerful systems, a spokesman said.

Users wishing to upgrade to the systems can transport some peripherals to the larger units, but the processors are entirely different. And although the Basic on the smaller Wang systems is similar to that offered on the WCS/60 and WCS/80, programs written on the smaller systems must undergo "some conversion," the firm acknowledged.

The company described the system as covering the IBM 34, Digital Equipment Corp. PDP-11/70 and Data General Corp. Eclipse range.

CPU Features

The 2200VS CPU includes a microprogrammed instruction set with more than 170 instructions, many of which are the same instructions found on the IBM 360, Wang said. The CPU contains 16 32-bit general-purpose registers, four 640-bit floating-point registers and eight 32-bit control registers.

Input/ouput is handled through independent I/O processors (IOPs). Each IOP includes its own microprocessor, allowing the CPU to continue processing data internally while I/O operations take place.

Wang uses semiconductor memory in its 2200VS-based systems. Memory features a 660-nsec average access time for two bytes and includes a six-bit error-correction code.

An automatic data compacting feature allows users to compress records before storing them on disk, the spokesman explained.

Characters that are repeated three or more times in sequence are stored as a single character and a repetition count. This compression is routinely performed on "print files" and can be used with "data files" when specified at the time the file is created, he noted.

Memory Expandability

The WCS/60 can handle from 64K bytes to 256K bytes of memory, while the WCS/80 is expandable from 256K bytes to 512K bytes. The WCS/60's disk storage capacity is expandable from 10M bytes to 150M bytes. The larger system accommodates a minimum of 150M bytes and can handle up to 2.3G bytes on-line using eight 288M-byte disk drives, the firm said.

Multiple CRTs can be attached to both systems with the WCS/60 accommodating up to 16 CRTs and the WCS/80, up to 23.

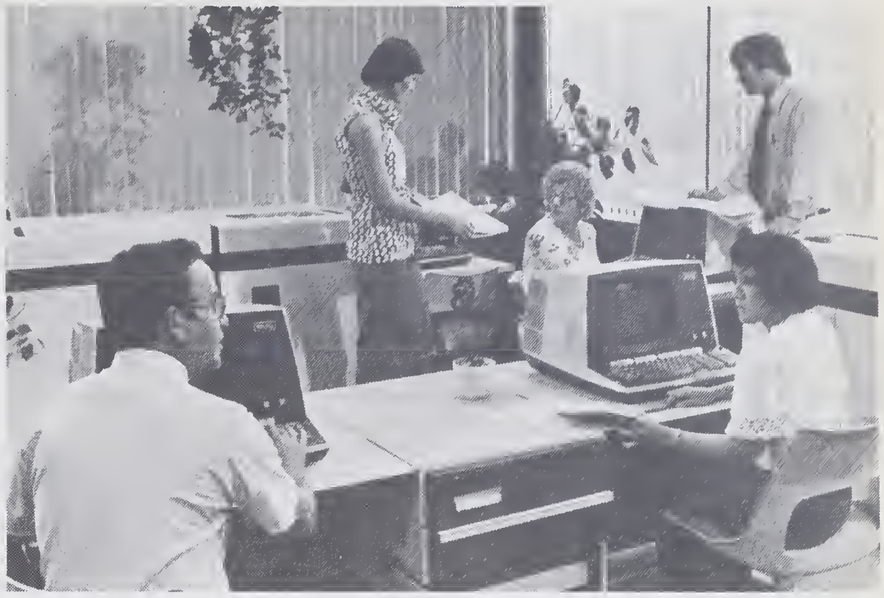
CRTs include a 24-line, 80 char./line screen and keyboard. One CRT would be designated as a system console to control printer allocation and other tasks including background processing of jobs that require batch operations. The jobs are run from a queue at the console, the company noted.

A communication IOP allows the systems to communicate with remote mainframes. IBM' 2780/3780 emulation, 3270 emulation, remote Wang 2246P workstation and Hasp bisynchronous protocols are also accommodated.

System Prices

A medium-sized WCS/60 system with 192K bytes of memory, six workstations, two 10M-byte disk drives, diskette and a 240 line/min printer costs $84,800.

A medium-sized WCS/80 system with 384K bytes of memory, 10 workstations, three 75M-byte disk drives, a floppy disk and a 600 line/-min printer costs $172,000. The systems will be available in December, Wang said from One Industrial Ave., Lowell, Mass. 01851.



Multiprocessing, multiprogramming and multiple workstations are features of the WCS-80 supermini pictured above. The 32-bit system was designed for business DP use.

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FBI Seeks Expanded NCIC, Agrees to Audit

(Continued from Page 1)

the purpose of ensuring there are adequate security and privacy safeguards for both current and historical data," Flaherty's letter said.

The computer scientists who visited the NCIC operation in Washington and who appeared at the congressional hearing applauded this attitude by Justice and the FBI. Edwards had received Flaherty's letter on Sept. 29, the same day on which the hearing was held.

Daniel D. McCracken, who chaired the Sipi task force and who is vice-president of the Association for Computing Machinery, tried to put the preliminary report into perspective by stating it was not "an overall evaluation of the effectiveness of NCIC."

Rather, the report's intent was to suggest "that there are some ... important questions that have not been addressed, to the best of our knowledge," McCracken said.

Among those questions are: what are the performance statistics of NCIC with regard to how often, in response to an inquiry, state law enforcement officials receive information about a missing person or a stolen article from the system? And has the NCIC had an impact on the nation's crime rate?

Focus on CCH

Scientists Myron Uretsky, director of the Management Decision Laboratory at the New York University Graduate School of Business Administration, and Joseph Weizenbaum, professor of computer science at MIT, focused their comments to the subcommittee on the CCH portion of NCIC.

"Even though a limited number of states have thus far elected to supply data to this system, the superstructure has now been put into place for the establishment of a nationwide police file on residents in this country," Uretsky said.

"It is thus imperative that we use the present opportunity to reexamine the experience with NCIC to identify present and potential future problems that must be overcome if we are to provide an adequate balance between the operating needs of police agencies and the need to guarantee personal freedoms," he added.

Weizenbaum fears the inadvertent creation of "a national computer data bank" and suggested to the subcommittee that NCIC and other efforts could become such a data bank, regardless of whether they are decentralized.

Any information system should be designed to be auditable in addition to being periodically audited, Weizenbaum said.

The Justice Department and FBI's desire for an NCIC message switching capability troubled the MIT scientist considerably. "I would consider the existence of a system with the capabilities that are envisioned here — the mere existence of such a system, in whomever's hands it may be — to be a very large threat to the civil liberties of the people of the U.S.," he stated.

If the Justice Department and Congress do permit the FBI to develop limited NCIC message switching, the states and not the bureau would control the dissemination of CCH data, the FBI's response to Sipi's preliminary report said.

"In an 'electronic context,' we do not believe that it can properly be said that 'the FBI would control the flow of ever-increasing amounts of criminal justice information throughout the country.' We feel that this could no more be said of the FBI than, say, AT&T and Western Union," the FBI stated, arguing that its equipment would act merely as a conduit and automatic switcher without reference to the contents of CCH transactions.

AS/6 Waiting in the Wings

(Continued from Page 1)

Itel is expected to announce a 7031 processor for the AS/5 very shortly — a move that will make that system competitive with IBM's newly announced 3031 processor. First shipments of the 3031 will probably begin in the fourth quarter of 1978.

The AS/6 with the 7032 CPU and operator console, two I/O processors with a total of six channels and 2M bytes of main memory costs $1.96 million compared with $1.9 million for a 2M-byte 3032.

The system can be upgraded to 16M bytes of storage and up to 16 channels. No additional I/O processors are needed for the full channel upgrade, a spokesman noted.

Itel has not announced any maintenance prices on the system, but the spokesman said maintenance will be equal to or less than equivalent maintenance charges on the IBM 370/168-3.

There is no multiprocessor configuration at this time and the spokesman refused to comment on future lease plans.

N.Y. Exempts T/S From Taxes

ALBANY, N.Y. — The New York State Tax Commission has voted to treat time-sharing services as informational services and tax them accordingly, according to Thomas H. Lynch, tax commissioner.

This means that if a manual payroll procedure was not taxed because it was an informational service, payroll on a time-sharing basis also will not be taxed, Lynch indicated.

The tax commission will examine the underlying nature of the transaction to determine if it is taxable and will not get involved with details such as where the terminal is located and how the system is accessed, he said.

Lynch is preparing to redraft regulations on time-sharing, which will be presented to the industry for review. The changes will be effective as of the date issue, which should be within a couple of months after they are sent to the New York State Legislature.

The commission set another meeting for Nov. 1. Meanwhile, several task groups are preparing reports.

Corrections

Some prices in the chart on Page 1 last week [CW, Oct. 10] were incorrect. The purchase price of an 370/168 with CPU, power supply, operator's console, memory and six optional channels is $3,554,920; on a four-year lease it costs $95,880/mo.

The prices of additional channels for the 370/158 and 158-3 are $16,160 for the fourth channel, $15,040 for the fifth and $7,565 for the sixth.

In addition, the relative power of an IBM 3033 is 185 if a 360/50=10.

Further, Itel Corp. reported its AS/6 processor is three to four times as powerful as its AS/5-3.

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FBI Questions Reevaluation of Need for NCIC

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The Federal Bureau of Investigation has responded to recent criticism of its National Crime Information Center (NCIC) in a statement that compares reevaluating the need for NCIC with reevaluating the need for police cars and two-way radios.

Prepared at the request of Rep. Don Edwards (D-Calif.), chairman of the House Judiciary Committee's Subcommittee on Civil and Constitutional Rights, the report addressed such subjects as system auditing, "hit" ratios and uptime.

The NCIC is audited, the FBI statement said, although not by an independent organization. However, "the FBI does not conduct unannounced audits [of state and local law enforcement participation in NCIC], as this would be an infringement on the sovereignty of the states."

The FBI stressed that its system is a cooperative one. "We believe that our friendly relationship [with state and local law enforcement agencies] helps promote the cooperative spirit needed to admit and remedy problems," the response said.

While it conceded that an in-depth evaluation of the system "would be informative and would help document the NCIC's many benefits," the bureau added that "it is questionable that such an evaluation is needed.

"This is because there has been built up over the 10 years of its existence a vast body of empirical knowledge regarding its value. One need only ask any member of law enforcement about NCIC to learn of its need and value," the FBI wrote.

"We do not believe anyone today would ask for an in-depth evaluation on the need for two-way radios in police cars; or, for that matter, on the need for police cars," the bureau added.

'Conservative Estimate'

Suggesting that the nearly 260,000 transactions that NCIC handles daily should be evidence of the system's utility, the FBI admitted that its belief that there are 1,000 "hits" a day represents "a very conservative estimate on the part of the FBI as to the NCIC hit rate."

The FBI is actually not in a position to know which of the positive responses generated by the system are true hits, because only the inquiring agency can identify a true hit by comparing NCIC information with the facts that prompted the inquiry, the response said.

The bureau suggested that the task force's criticism of the NCIC's 94% uptime as an unacceptable record in most commercial enterprises was a comparison of "apples and oranges."

The NCIC operates in a law enforcement environment, 24 hours a day, seven days a week, while most banks and insurance companies operate in an on-line environment 16 hours or less per day," the FBI said.

The bureau added that the system is futher constrained by having to interact with a multiplicity of types of computers and terminals provided by a diversity of manufacturers.

Additions to the NCIC communications capability would help minimize downtime, the FBI statement said.

The House Subcommittee on Civil and Constitutional Rights plans to hold further hearings on the NCIC this fall to obtain more details.

HIS Enhances Series 6000

(Continued from Page 1)

can handle up to 1M words of storage, up from its previous limit of 512K words, HIS said.

The Level 66 upgrade option is available to users of the 6025, 6040 and 6060 Extended Instruction Set models in the Series 6000 line. While enhancement of these systems means modifying and/or partially replacing the 6000 processors, systems controllers, I/O multiplexers and memory, upgrading can be done at the user's site, according to a spokesman.

After the upgrade, HIS said, series 6000 users will be able to connect any Level 66 unit record equipment, magnetic media or front-end network processors and use Level 66 software. Those users with 6025 and 6040 systems can then upgrade to multiprocessor configurations if they wish, the firm noted.

"Due to wide variations in the Series 6000 customer configurations, pricing for the upgrade package will be determined on an individual site basis," the spokesman said, "and will range from $250,000 to $1 million."

With the memory enhancements, the 6025, which formerly could accommodate 128K words, can be expanded to 512K words for $380,184 or $9,052/mo on a five-year plan. The 6040, which previously had a ceiling of 256K words, can now handle 512K words for an additional $5,892/mo on the five-year plan or $247,464.

The cost to extend the 6060 from 512K to 1M words is $9,404/mo or $325,168.

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Even 'Squealers' Deemed Vital to DP Planning

CW at Info/Expo

By Catherine Arnst
CW Staff

WASHINGTON, D.C. — Planning is essential to data processing if a project is to meet its goals, Capt. Stephen R. Ruth of the U.S. Navy told a Data Processing Management Association group at Info/Expo '77 here last week.

The routine elements of a good plan are goals, objectives, pizzazz, clarity and management support, he said.

The project planner must be aware of the interactions of all decisions, because every action taken will have an effect on something else.

There are several roles involved in a plan, Ruth said. There is the leader, who doesn't really lead but instead sets up conditions that will induce people to do what he wants. Next, there is the power center — which is rarely the leader — that actually leads people to achieve the goals the titular leader wants achieved.

Then there are the workers, the recorder — who keeps track of everything — and, most importantly, according to Ruth, the corporate squealer.

The squealer is someone institutionally involved in direct communication with the boss, Ruth explained. Such a person can thus rapidly communicate when a project isn't working out.

A squealer is needed because most people working on a project they planned suffer from "cognitive dissonance"; they refuse to see what they don't want to see. Consequently, they won't admit to top management that a goal they set cannot be met. That is the job of the squealer, Ruth said.

It is vital in any plan to have a certain amount of accountability tension — that is, "when something goes wrong, you know exactly whom to fire," Ruth quoted. It is desirable to have commitment, a merit/demerit structure for rewarding or punishing employees and an isolation structure to keep the project team away from other job pressures.

It is useful to have team spirit and enthusiasm, but Ruth pointed out that the New York Yankees had very little of either this year, and they still won the American League pennant.

To measure the effectiveness of a project, one can count the number of elapsed days, the skills retained, the number of checkpoints passed successfully, the degree of user satisfaction and the amount of management involvement, Ruth said.

It is especially important to remember "Ruth's rule," he said: If you learn the bad news early, pass it on.

Variety of Personal Shortcomings Seen Bases for Manager Failure

By Jeffrey Beeler
CW Staff

WASHINGTON, D.C. — Some DP managers are habitual loud mouths who meddle incessantly in other people's business and pretentiously display their knowledge.

Others affect a cocky and abrasive manner that their colleagues find insulting and obnoxious. And still others lack coolness under fire and go to pieces at the first sign of trouble in their departments.

If you know or work with DP managers who fit these descriptions, take heart. The troublemakers will probably be out of your hair soon because they embody at least some of the characteristics that typically lead to failure in the DP management field, according to Jim Towsen, general services manager of the Statesman Group in Harrisburg, Pa.

Speaking on the subject of "why managers fail," Towsen told a crowd of about 250 at Info/Expo '77 here that a DP manager's downfall can spring from a variety of personal shortcomings.

Some of the most common of these defects include a failure to cultivate a profesional demeanor, refusal to conform to corporate regulations, inadequacies as a planner and organizer, and an inability to accept other individuals' points of view.

Another prime reason for failure among DP managers is lack of tact in interpersonal relationships, Towsen said.

Some managers, he explained, maintain a hypocritical attitude toward their colleagues. Among their superiors, they spare no effort to curry favor and portray themselves in as favorable a light as possible.

But among their subordinates, they are overbearing and tyrannical and seldom miss an opportunity to demonstrate their superior status in the corporate hierarchy.

Towsen also blamed alcohol and drug abuse for the undoing of many DP managers.

To guard against these personal pitfalls, Towsen urged DP managers to encourage their underlings to accept additional executive duties and responsibilities.

Job Threats

Too many managers, he explained, regard their subordinates as job threats and thus present them from advancing professionally.

Towsen also advised DP managers to avoid showing favoritism in making job assignments and to keep up as much as possible with the latest technical developments in their field.

On the subject of utilizing time efficiently, Towsen offered these suggestions:

- Prepare a checklist of important tasks to be performed and then stick to it.
- Use a dictating machine to record all important memos.
- Don't try to tackle too many tasks at the same time.
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Await Government Go-Ahead

CDC, Soviets Restart 'Recursive' CPU Project

MINNEAPOLIS — Control Data Corp. and the Physical and Technical Institute of the Soviet Academy of Science in Leningrad are contemplating joint work on a "recursive" computer.

The work would involve proving the feasibililty of a machine that can process blocks of data in any order depending on what part of the system is available at any given moment, according to CDC.

In contrast, conventional computers must process data in a set order determined by the computer program. If proven feasible, a recursive computer should be able to process data much more rapidly than a conventional computer of equivalent size, CDC said.

For example, according to Soviet designers, a recursive system containing 64 interconnected identical microprocessors should be able to do 10 million operation/sec, making the concept ideal for real-time control of industrial processes.

Leningrad Talks

CDC executive vice-president Robert B. Schmidt indicated any further progress of the joint venture would be made only after obtaining approval from the U.S. government.

Schmidt, who participated in the talks in Leningrad, said "So far we have simply discussed the possibility of small-scale joint investigation to prove the feasibility of this unique concept."

One of Two Plans

The concept of a recursive computer was one of two that CDC and the USSR agreed to investigate under a 1973 agreement. CDC dropped discussion of a large-scale machine based on a rearrangeable structure because of the U.S. government's reluctance to grant approval, CDC said.

The concept of proving the feasibility of a recursive computer was tabled shortly thereafter. However, interest was renewed this March as a result of new progress by scientists at the Leningrad academy, CDC said.

The Soviets have indicated they expect the cost of such a machine to be less than one fourth that of a conventional machine.

According to Schmidt, the Soviet scientists have been working on this concept for more than 10 years. Two laboratory models of the computer have been built, with the remainder of the system simulated by a Soviet Besm-6 computer. Additional work was first aimed at comparing cost and performance with that of a conventional machine.

German System Leads Officials To 4,000 Spies

Special to CW

BONN, W. Germany — Computers operating from a bunker in the mountains near here have succeeded in uncovering 4,000 East German spies, according to the head of West Germany's Office for the Protection of the Constitution.

According to a news report, personal details and behavior information on individuals are entered into a computer which analyzes suspicious activities. For example, data that reveals a person has been often married and divorced, has used false names or has had questionable jobs may lead investigators to East German agents and terrorists.

So far only one embarrassing error has been revealed. That is about Prof. Klaus Traube, a nuclear scientist whose association with leftist students cost him his job. A full examination of the facts cleared Prof. Traube of all suspicions of disloyalty.

The youngest spy the computer has discovered is a 17-year-old school boy.

The government did not mention any concern about possible invasions of privacy resulting from the system's use.

Finance Systems Topic of Meets

STAMFORD, Conn. — Real Decisions Corp. (RDC) will present a one-day seminar on criteria for choosing an interactive financial planning system. The seminar will be held on Nov. 4, in New York City, on Nov. 16, in Chicago and on Nov. 18 in San Francisco.

The seminar is aimed at providing users and potential users of such planning systems with the tools needed to select the right system for their particular needs.

Speakers will include John M. Lewis and Robert J. Bergstrom, principals and cofounders of Real Decisions Corp., and Hillel Segal, president of the Association of Time-Sharing Users (Atsu).

The cost of the seminar is $185 for the first registrant from each company and $115 for each additional registration. For more information, contact Real Decisions Corp., 870 High Ridge Road, Stamford, Conn. 06905.

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DP Managers Still in Adolescence: Withington

By Catherine Arnst
CW Staff

WASHINGTON, D.C. – Data processing is a young science and DP managers are still in their adolescence – that is, immature, arrogant and often wrongheaded.

That was the message delivered by Frederic G. Withington, an Arthur D. Little, Inc. consultant, at Info/Expo '77 sponsored by the Data Processing Management Association here last week.

Although Withington said one must "have pity on DP managers, whose job has never been easy," he qualified that sentiment by adding that "we've partly brought these problems on ourselves . . . by acting like adolescents."

DP managers often have all the classic faults of the typical adolescent, he said: They are know-it-alls, simplistic, self-centered, too ambitious, incommunicative and arrogant. In addition, when they become excited, they are overly energetic and unwilling to wait for others.

Managers must start to grow up if they are to cope with the rapid changes through which DP will be going in the future, because "things will apparently get worse," Withington said.

How do DP managers grow up? Withington offered several suggestions:

They must accept change as the essence of the DP manager's job; give up trying to develop utopian systems; let users do some of the applications; pilot test new systems and then be prepared to redo them if the test fails.

In addition, they should work in groups, not as individuals; change the organizational structure of the DP department frequently; and conserve themselves by promising and delivering less.

There may be outcries that the boss wants the big promises, but then again, "maybe your boss is getting tired of adolescents running around the place," Withington concluded.

CW at Info/Expo

Hayden Offering Updated Version Of DP Dictionary

ROCHELLE PARK, N.J. – The Hayden Book Co. has announced the publication of the revised second edition of its *Standard Dictionary of Computers and Information Processing*. Written by Martin H. Weik, the dictionary is described as a source/reference book, featuring explanations, examples and illustrations for over 12,500 hardware and software items.

Unlike other dictionaries, it cross-references the terms to other closely related concepts, and all its definitions are consistent with the lastest professional usage approved by technical society, government, national and international standards bodies.

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They'll Be First to Take Heat
Managers Warned

By Jeffry Beeler
CW Staff

WASHINGTON, D.C. – The proliferation of distributed data processing (DDP) systems in the 1980s holds great promise for the computer industry, but it also poses grave risks for DP managers, Clarence W. Spangle said in his keynote address at Info/Expo '77 here.

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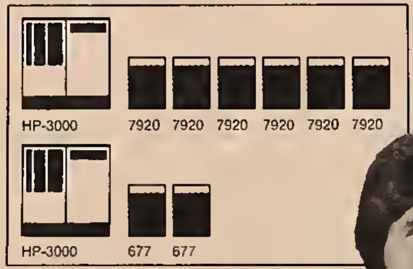
Part II is Memorex's impressive 677, a 200 megabyte disc drive that boasts a track record of over 15,000 successful installations. Together, these parts form a package that is totally hardware/software transparent under MPE—and totally superior to the disc package HP offers with the Series II.

Sometimes, Two Rocks Are Better Than One.

We know what you're thinking. Single-source systems, particularly Hewlett-Packard single-source systems, can make one feel very warm and cozy. But warm and cozy can turn uncomfortable and unprofitable in a hurry. Because it doesn't make a lot of sense to pay for the security if the system doesn't deliver the storage you need. Particularly when you can get both the security ond the storage by working with us and our working partner, Memorex Corporation—like HP, a rock to be reckoned with.

Memorex, long known as the "memory/excellence" people in the IBM-compatible marketplace, has helped us make the HP 3000 a sensible, reliable, cost-effective alternative to IBM mainframes. Perhaps more than anyone else, Memorex has "written the book" on the successful installation of disc subsystem add-ons. They have, in large measure, shown the way in making "mixed vendor" systems preferable instead of just tolerable. They've done it with support—before, during and after the subsystem installation.

But most of all, Memorex has done it with the product.



Sometimes, Two Drives Are Better Than Six.

Particularly if they are Memorex 677 drives. This 200 megabyte, single spindle, disc storage drive is the product of three generations of Memorex disc experience. And it is the one product that has been installed more often than any other of its kind—count them, over 15,000 units at work for customers today.

No question. This is exceptional, feature-laden hardware. But what is more important to you is this: with 150 megabytes each of usable storage, *two* 677's *will* do the *work of six HP 7920* discs. That can mean upwards of 50% cost savings on the initial drive purchase alone. It can also mean dramatic increases in the mean time between failure. Because over and above the proven reliability of the 677, two electromechanical devices are simply going to break down a whole lot less than six.

Your HP 3000 Will Never Know How Much You Are Saving.

Thanks to Microcomputer Systems MSC-1000 disc controller, which emulates the presence of the biggest drive HP can offer, the 50-megabyte 7920—without emulating either its capacity or its overall cost. To the Series II, our 677 will look exactly like three 7920's. This means usable capacity of 150 megabytes per spindle, with up to eight spindles (or 1200 megabytes) supportable by one of our MSC-1000 wonders. It also means that no customized, non-HP software is required to do the trick. You'll never have to worry about staying up to date with future HP software enhancements to the 3000.

Disc Subsystem Compar

Fealure	HP 792
Software Transparent under MPE/OS-3000	Yes
Microprogrammed Controller Architecture	Yes
Full ECC (error correction)	Yes
3330 Disc Technology	Yes
Capacity per spindle (megabytes)	50
Reliability	Good
Complete Maintenance Support	Yes
Price	Competiti
Number of installed spindles	Less Tha 1000
Operator oriented self-testing capability	No

Rock-Solid Support.
The World and Acros
Board.

You are still saying to you
you have significantly mo
spindles out there than th
yes, simple math tells n
MTBF on yours will be a th
And granted, I could save
50%, even 100% on drives
what about once it
no longer yours and
just happens to . . ."
Relax. Custo
is guaranteed. In s
forget one of th
which we have
And this produc
Corporation i
to support th
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The Waves Of Change

By Charles P. Lecht

CHAPTER X

We may well approach our crystal ball with the statistics reflecting past advances in computer technology in mind. They have been impressive, not to say incredible:

- Hand-held calculator costs have declined a hundred fold in 10 years.
- The cost of random-access memory (RAM) has declined by an average of 30% to 40% per year since 1970.
- The annual usage of logic gates (function) or bits of memory has increased 2,000 times in 17 years (i.e., in 1960 approximately 500 million transistors were produced, while by 1977 an estimated one *trillion* equivalent functions or bits were manufactured and shipped.
- The number of components per integrated circuit (IC) has nearly doubled *annually* since 1960 — from one component per circuit in 1960 to 256 bits or components per IC in 1967 to 16,384 components per IC in 1977.
- Disk drive capacity has jumped from 5M bytes in the early '60s to over 500M bytes today. Price per megabyte has also decreased nearly a hundred fold during this same period.

This very limited but highly representative sample of dynamic improvements could lead some observers to conclude that there is little room for further advances and that the really significant developments must be behind us. This chapter will, I hope, demonstrate that such conclusions are false and, in terms of electronic logic and storage, "future shock" shall not truly be upon us until the mid-1980s (assuming that political, economic and psychological forces do not work to delay it beyond its "natural term").

Nonetheless, today's technological environment, when viewed as a "happening" quite divorced from politics, psychology and economics, is indeed one of increasing transience. The seemingly continuous stream of product announcements, some coming from heretofore little-known sources, suggests an accelerating orchestral staccato.

New innovations, hoped for yesterday and ordered today to be delivered tomorrow, have a high probability of being called obsolete before installation. By obsolete, I do not mean useless. Rather, better alternatives will be made available.

But the din of product announcements also suggests the computer systems manufacturing organizations are "onto something big" in their quests for market position. Quite naturally, they must exploit their innovation continua to the fullest.

Users must reassess their ways of perceiving data processing product and services procurement policies, or they stand a good chance of seeing their DP budgets inadvertently siphoned off for the good of technological progress with little to show for it.

For the conspiratorially inclined, this may look like a concerted plan of the computer industry; nothing could be further from fact. If for no other reason, the industry isn't that organized.

Not unlike the dilemma facing the broker with a seat on the exchange who must assess when a stock will bottom or top out, the DP manger is faced with buy and sell decisions of similar complexity. An increased interest in today's technological trends can go a long way toward resolving his difficulties.

But, in a sea of controversy over the ultimate ends toward which these trends are driving, remaining cool and conservative is mandatory. For the extrapolated end points of today's trends are absurd. These all seem to suggest that infinite capacity at zero cost will occur in the latter 80s. We know that's not going to happen.

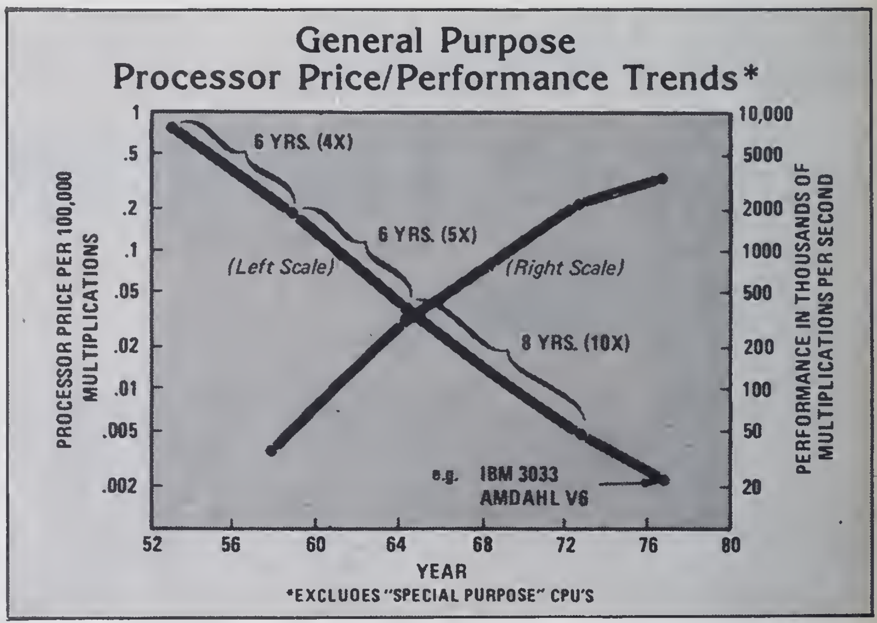
While the user population may be experiencing instability in DP planning, such instability being caused by the increasing amplitude, frequency and impact of today's waves of change, the systems manufacturers are far more sure of what's happening and where it's all going. Their difficulties lie in accepting and reacting to change when it is adversely affecting their individual businesses and in accepting and capitalizing upon such change when it is not.

The research departments of those which can afford research are steadily racing toward fulfillment of their goals in improving systems intelligence, reliability, accessibility and serviceability — all of this in delicate balance with economic viability. Some of the major areas commanding their attention follow.

Processor Performance/Price

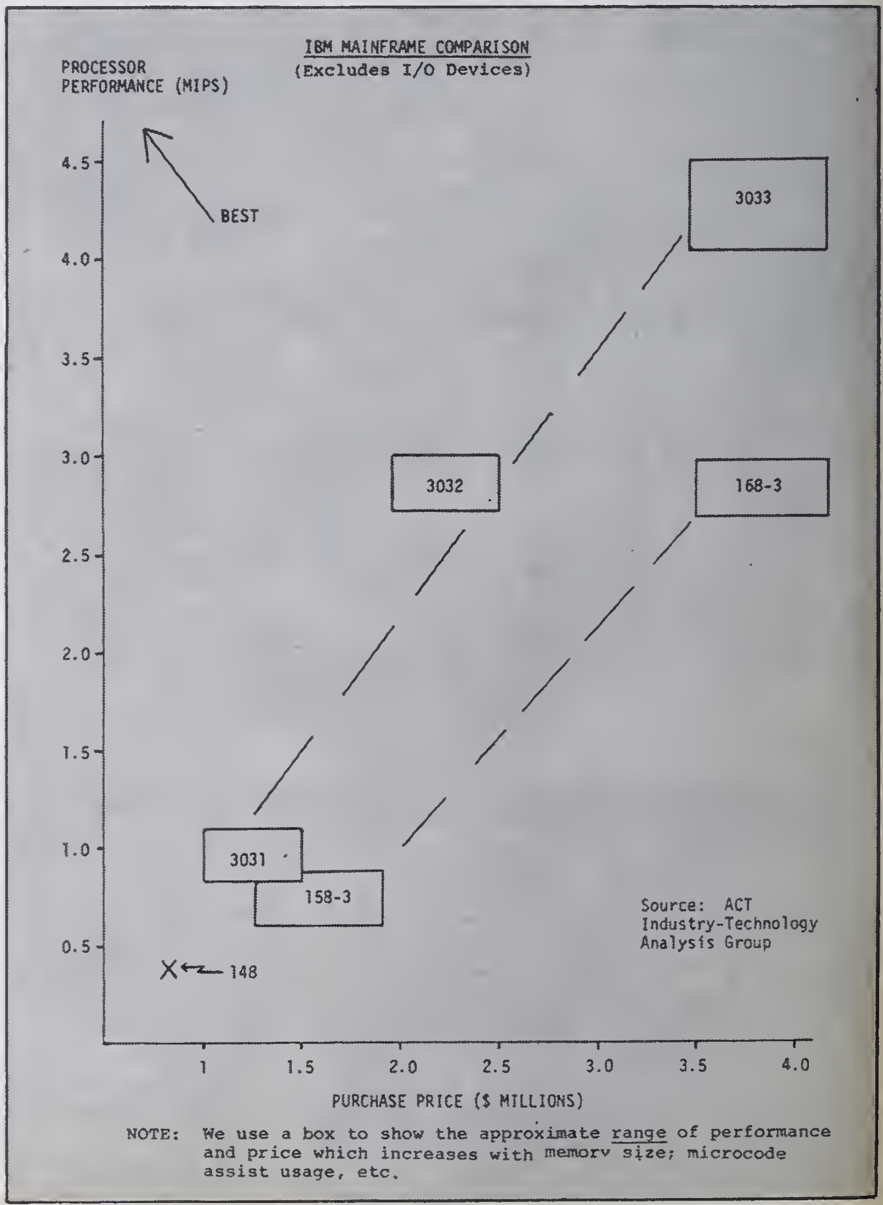
General-purpose processor performance can be measured in terms of "raw" Mips ratings - add time or number of multiplications executed per second. Obviously such comparisons do not take I/O capability or software efficiency, not to speak of user environment scenarios, into account, and therefore should not alone comprise the yardstick used in the evaluation of "systems."

However, it is true that in evaluating computers which share similar architectures (as in the case of the IBM


General Purpose Processor Price/Performance Trends*

*EXCLUOES "SPECIAL PURPOSE" CPU'S

Figure X-1


IBM MAINFRAME COMPARISON
(Excludes I/O Devices)

Source: ACT Industry-Technology Analysis Group

NOTE: We use a box to show the approximate range of performance and price which increases with memorv size; microcode assist usage, etc.

Figure X-2

This week, in his final chapter, Lecht takes a look at hardware technology trends, reviews the strong advances in price/performance made by the computer industry in recent years and predicts even greater ones. What is the technological breakthrough underlying the phenomenon that will make these advances possible? Lecht says IBM has the answer — the Josephson device, which some think will boost performance 10,000 times.

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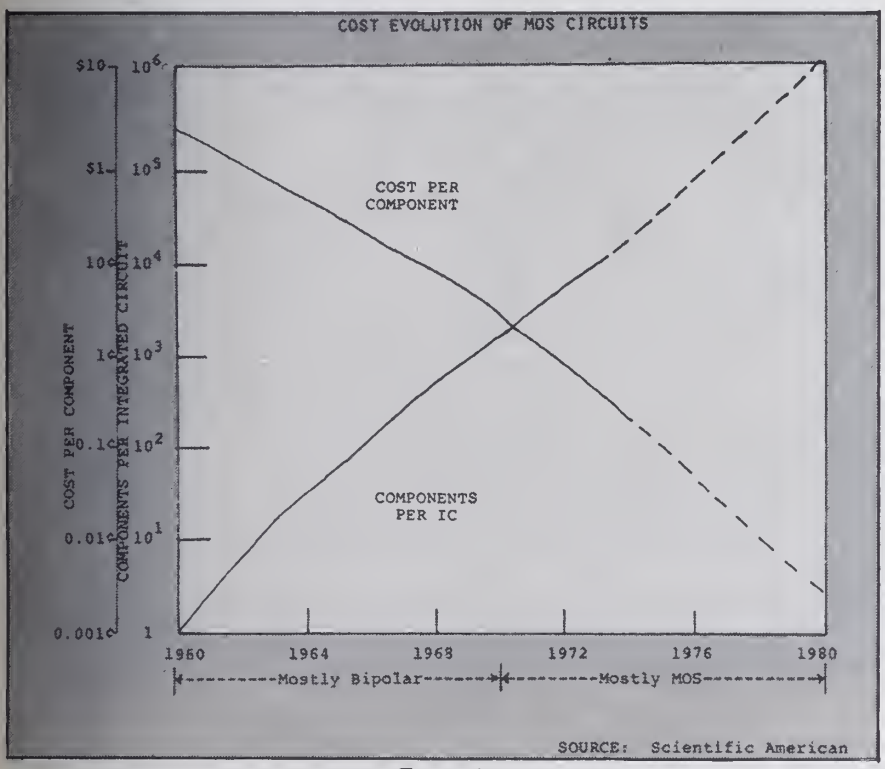
370 series, for example), these comparisons have greater validity insofar as the establishment of relationships or processor performance ratios is concerned.

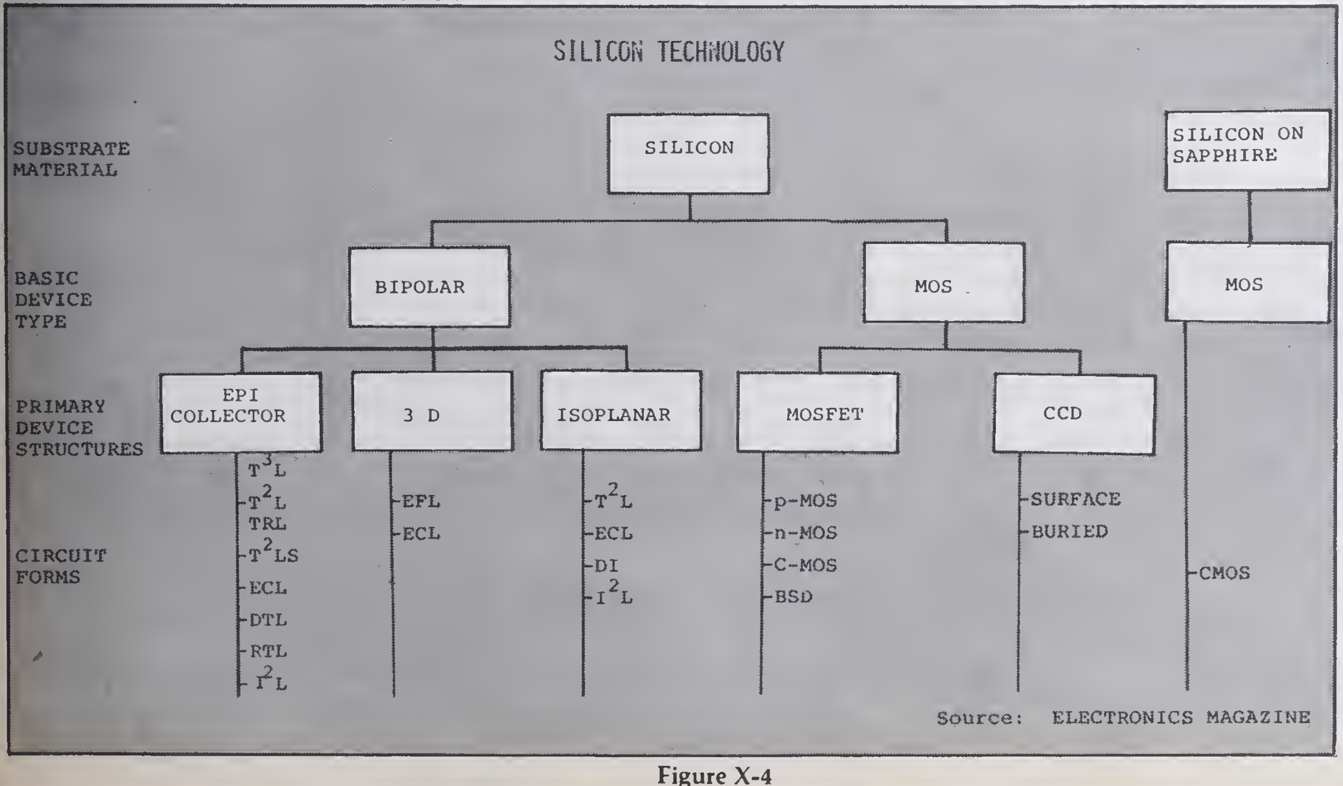
The graph in Figure X-1 shows that "large-scale" general-purpose processor performance has increased from about 20,000 — to nearly 5 million Mips (or a 250-fold improvement) from 1958 to 1978. During this 20-year period, note that also the *rate* of performance price improvement has itself accelerated.

For example, 1953 to 1958 experienced a fourfold decrease in price per 100,000 execution/sec; during the next six years (1958-64), this same performance level was available at 20% of 1958 prices; and over the next eight years (1964 to 1972), another tenfold decrease in price (or increase in performance/$, to put it another way) ocurred.



SOURCE: Scientific American

Figure X-3



Source: ELECTRONICS MAGAZINE

Figure X-4

From 1972 to the present (1977), however, there was only a two- to three-fold improvement in performance/price (by IBM's 3033, 3032, 3031, etc.).

This "mere" two- to threefold improvement in CPU performance/price (chez IBM) during the past five years seems to represent a temporary condition and tends to verify that the 3033 (and 3032 and 3031) are simply "interim" — if not end-game — products.

In fact, the new IBM 3032 and 3031 both fit on the 3033 performance/price curve (see Figure X-2 below) and were predictable. Other multiprocessor versions of the 30xx are also expected by the second quarter of 1978.

While circuit (ECL) packaging and heat challenges may slow down the rate of Mips improvements for single-processor configurations (until the System/80 is introduced in 1979-80), multiprocessors (two to four CPUs) should compensate; i.e., each additional CPU should be priced lower than the initial processor complex.

Semiconductor Memory, Logic

"Conservative" IBM put the stamp of approval on semiconducor memory with the introduction of 370 series Mosfet storage technology in August 1972.

Various types of memories which use bipolar and MOS technologies are currently available. RAMs, read-only memories (ROM), Programmable ROMs (Prom) and electrically alterable ROMs (Earom) are all part of the current product offerings from the independent semiconductor industry.

The RAM is used for main memory and is presently available in both bipolar and MOS forms. MOS currently enjoys substantial advantages over bipolar because of its higher packing density, its improved access speeds, lower manufacturing complexity and lower cost, and it should become the dominant technology by the end of this decade.

Intel Corp. has been enormously successful in its pioneering efforts in the development of a 1K, p-channel, MOS, dynamic RAM (dynamic RAMs need periodic refreshment of the signal levels). Access time is currently 300 nsec, cycle time is 500 nsec and power dissipated is 100 microwatts per bit.

The 1103 was initially introduced in 1970 at a price of $60. By 1973, the price was averaging $4, or .4 cent/bit.

Current efforts in the semiconductor industry are being directed toward the achievement of production quantities of 4K and 16K n-channel MOS, dynamic RAMs. (IBM has already indicated that 32K MOS RAMs are available in the laboratory.) The n-channel product is highly desirable because of higher speed characteristics compared with p-channel.

In addition, chip size will increase and rapid price reductions may be anticipated once the manufacturing process has stabilized.

Mosfet devices have found wide use in the IC industry because they are naturally suited to planar surfaces. Thus they are ideal for production of large arrays by standard processing of silicon wafers. Field effect transistors (FET) occupy only a fraction of the chip area required for bipolar.

In addition, the manufacturing process to produce an MOS integrated circuit requires fewer steps than for bipolar, so significant cost reductions may be achieved. The price function advantage for MOS over bipolar frequently is as high as 10:1. Note that IBM recently switched from bipolar to MOS chips for the 370/138 and 148.

The graph in Figure X-3 shows cost per component for bipolar and MOS technologies. After 1970, MOS dominated the pricing structure. In that year, the cost per component was 1¢ with 1,000 components per IC.

Memory (RAM) prices declined by about 30% to 40% annually between 1971-77 and the extrapolated values indicate a cost per component by 1980 approaching .001 cent, with a half mil-

(Continued on Page 14)

In Depth: The Waves of Change

(Continued from Page 13)

lion to a million components or bits per IC.

The chart in Figure X-4 shows the silicon family tree and the various devices and circuit types.

Over the years, the ability to manufacture core has improved to the point where prices are about .2 cent/-bit. Typical core speeds are concentrated in the 500 nsec to one microsec access time range.

Now, however, high-speed semiconductor memory has become economically available in both bipolar and MOS forms, and mid-1975 was probably the turning point. Intel was selling its 4K Model 2107A-8 (a 420 nsec MOS device) for less than $12 in lots of 100 and this year it was anticipating .1 cent/bit to be a realistic goal.

The speed requirements of mainframe memory can be met by bipolar and silicon-on-sapphire (SOS) devices. While core, plated wire and MOS memories have in the past satisfied some of the speed requirements for large-scale usage, only bipolar and SOS devices appear to qualify at speeds exceeding 40 nsec.

The SOS manufacturing technique requires that very thin layers of silicon be deposited on a flat substrate of synthetic sapphire. Parasitic capacitance is reduced by a factor of 20 compared with standard MOS transistors.

When MOS circuits are manufactured with this process, they combine the high speed attainable by bipolar transistors with the packing density of MOS. At present, SOS structures are more expensive to fabricate than MOS.

Forecasts call for NMOS, bubbles and charge-coupled devices (CCD) products to equal or exceed the price/-bit of core after 1976. By 1977-78 bubbles and CCDs could be at prices below .1 cent/bit.

PMOS, which is already available at prices approaching those of core, has speed disadvantages but can perform many main memory tasks. Slower speed MOS memory chips are combined with high-speed bipolar caches (buffers) in the 370/158 and 168, Amdahl Corp. 470V/6 and V/7, the Univac 1100/80 line, Burroughs 7800, Honeywell Level 66, etc.

Logic Trends

While general-purpose mainframes have declined in price over time, typical minicomputer prices (with 32K bytes) have declined more rapidly, i.e., 18% to 20% annually between 1971-77 (e.g., the Hewlett-Packard Co. HP-2100A in 1967 vs. the HP 21MX in 1977). These significant improvements are directly related to IC developments. Today, only about 10% of a typical minicomputer's value is composed of ICs.

Logic families are closely related to IC development. In the late '50s, resistor-transistor logic (RTL) seemed to be the best way to go. By 1962, diode-transistor logic (DTL) had appeared. Transistor-transistor logic (TTL) was announced in the early 1960s, while initial versions of emitter-coupled logic (ECL) were introduced by Motorola in 1962. (IBM used versions of ECL in the 7030 Stretch machine in the mid '50s.)

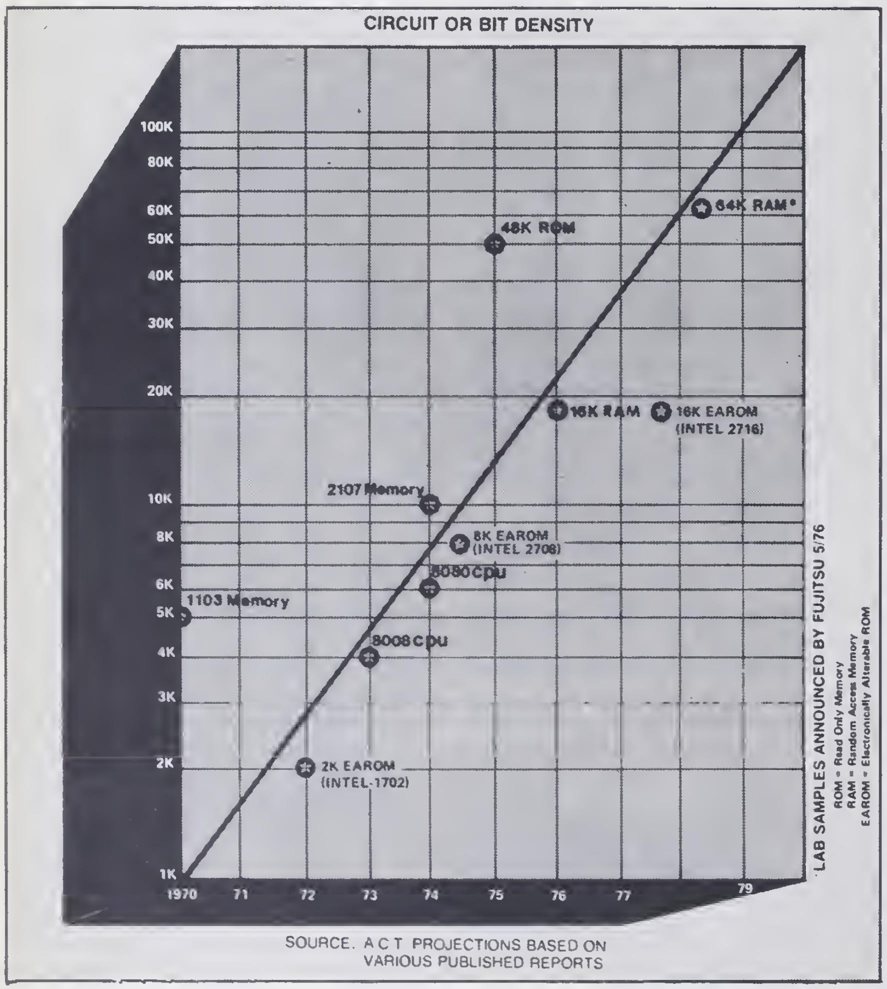
The basic requirements for any logic family are:

- Flexibility.
- Speed.
- Availability of complex functions.
- High noise immunity.
- Wide operating temperature range.
- Low power dissipation.
- Lack of internally generated noise.
- Low cost.

TTL (in various forms) and ECL are the primary surviving bipolar logic families used by most computer designers today. IBM has utilized a current switched logic (ECL) for its 370 computers.

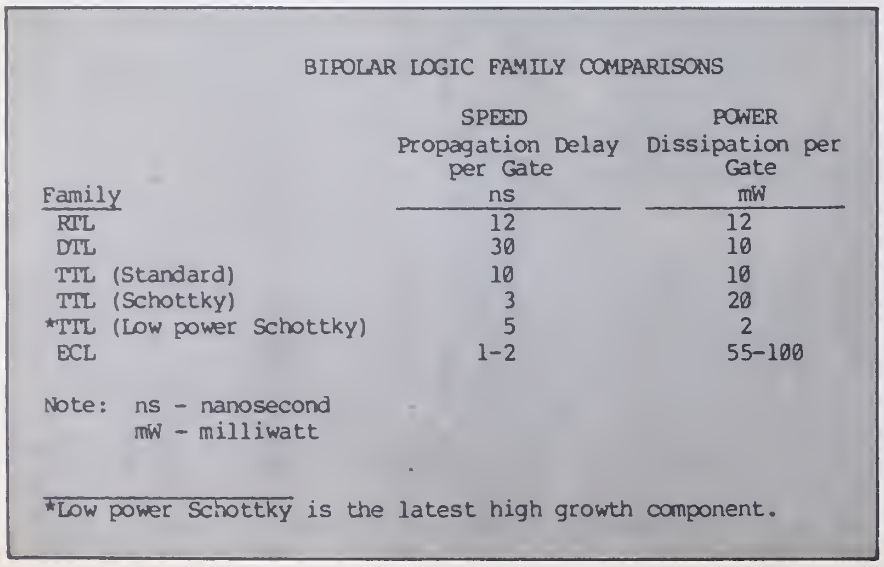
While such logic has the advantage of higher speeds, it is also generally true that as speed increases, so does power dissipation. Removal of circuit-generated heat is essential for reliable operation.

Figure X-6 compares logic families in terms of speed and power dissipation. Schottky TTL is a high-speed version of the standard TTL. From the table it can be seen that the progression from RTL to ECL leads to increased speeds



SOURCE. A C T PROJECTIONS BASED ON VARIOUS PUBLISHED REPORTS

Figure X-5



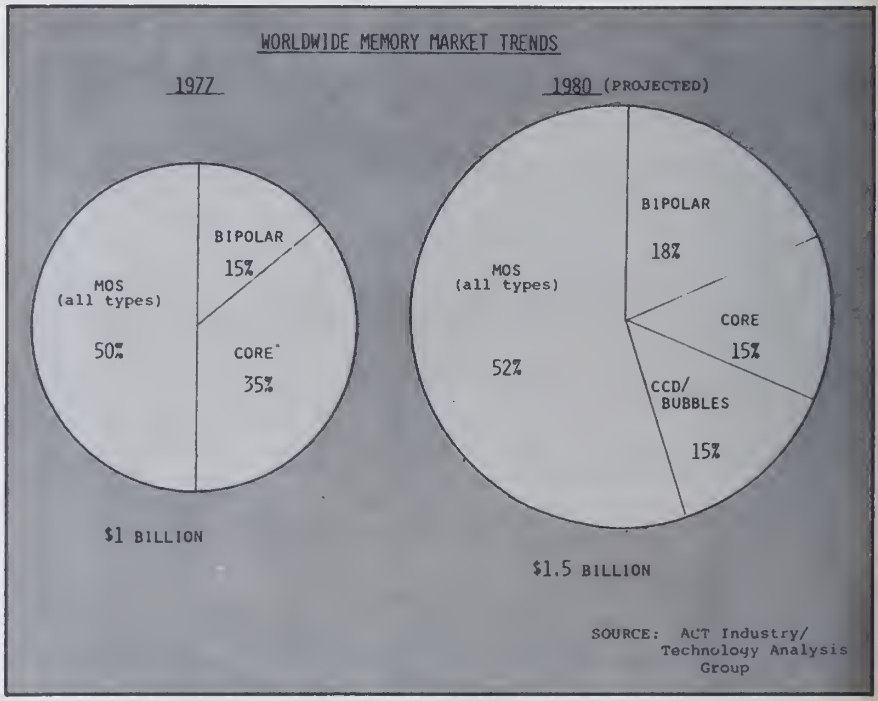
BIPOLAR LOGIC FAMILY COMPARISONS

Family	SPEED Propagation Delay per Gate ns	POWER Dissipation per Gate mW
RTL	12	12
DTL	30	10
TTL (Standard)	10	10
TTL (Schottky)	3	20
*TTL (Low power Schottky)	5	2
ECL	1-2	55-100

Note: ns - nanosecond
mW - milliwatt

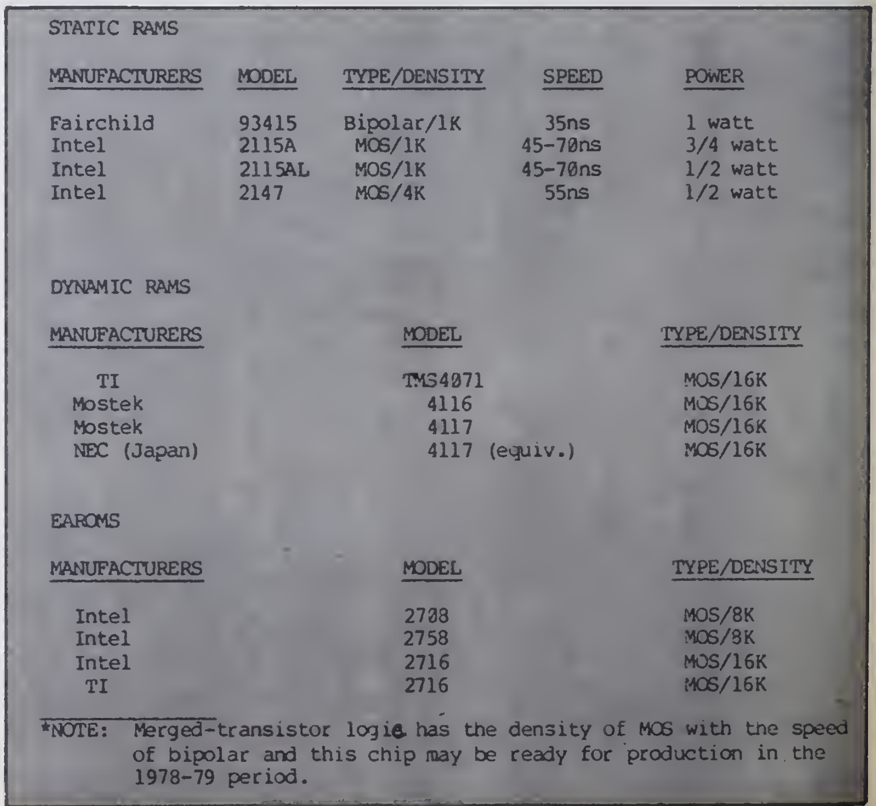
*Low power Schottky is the latest high growth component.

Figure X-6



SOURCE: ACT Industry/ Technology Analysis Group

Figure X-7



STATIC RAMS

MANUFACTURERS	MODEL	TYPE/DENSITY	SPEED	POWER
Fairchild	93415	Bipolar/1K	35ns	1 watt
Intel	2115A	MOS/1K	45-70ns	3/4 watt
Intel	2115AL	MOS/1K	45-70ns	1/2 watt
Intel	2147	MOS/4K	55ns	1/2 watt

DYNAMIC RAMS

MANUFACTURERS	MODEL	TYPE/DENSITY
TI	TMS4071	MOS/16K
Mostek	4116	MOS/16K
Mostek	4117	MOS/16K
NEC (Japan)	4117 (equiv.)	MOS/16K

EAROMS

MANUFACTURERS	MODEL	TYPE/DENSITY
Intel	2708	MOS/8K
Intel	2758	MOS/8K
Intel	2716	MOS/16K
TI	2716	MOS/16K

*NOTE: Merged-transistor logic has the density of MOS with the speed of bipolar and this chip may be ready for production in the 1978-79 period.

Figure X-8

and higher dissipated power. Circuit designers currently have several choices available for optimization of speed and dissipated power.

Integrated injection logic (IIL) is a new design which will increase bipolar circuit density. These devices could move out of the laboratory next year.

At IBM in Boeblingen, Germany, the terminology used for the same basic approach is merged-transistor logic (MTL). MTL has the density of MOS with the speed of bipolar; this chip may be ready for production in the 1978-79 period.

The IIL approach utilizes gates which do not require current source resistors. The space required for an entire gate is 1 to 2 square mils, or the space needed for one transistor in the TTL family. It is capable of propagation delays approaching 5 nsec with power dissipation as low as one nwatt per gate.

The above advancements in ICs (ROMs, RAMs, Proms, Earoms, etc.) will permit "plug-in firmware" to be practical by the end of the decade. Burroughs already uses this concept in the Burroughs Scientific Processor (BSP), as do Texas Instruments' calculators (models 58 and 59).

Main Memory

The IBM 370/158 and 168 main memory requires nine times less area per cell than the older 360/85, and recent CCDs (from TI) of the one-cell variety have substantially increased relative bit density even further. However, the technology is quickly approaching a point where it will not pay to stretch it any further using *current* photolithography methods; i.e., the potential advantages from increased density vs. the technical problems of cooling, achieving the incredibly small line widths and so forth, will yield less of a payoff in the future.

In terms of photolithography, currently 6 microns is typical and this can be reduced to 2 microns using shorter wave lengths or electronic beam exposure techniques. IBM's near-term objectives appear to be to achieve 500 to 600 circuits on a 1/4-in. by 1-in. wafer.

The IC Leaders

Total worldwide consumption of all types of ICs (not just memory devices) has climbed to nearly $4 billion in 1977. Figure X-7 shows the memory circuit market share breakdown.

Top-tier companies include TI, Motorola, Fairchild and IBM (internal supplier only). Second-tier firms are Mostek, National Semiconductor, Intel, Advanced Micro Devices, RCA, ITT and Zilog, among others.

Recent high-speed, static and dynamic RAM competitive products (components) are shown in Figure X-8.

IC Storage in Japan

On June 7, 1976, Fujitsu announced it had succeeded in developing a 64K-bit RAM chip. The characteristics include 64,000 bits on a silicon substrate, performance in the 100- to 200 nsec access time range and substitution for electron beam and x-ray exposure techniques by current semiconductor fabrication processes.

Although this product has been developed in the lab, we should not expect 64K chips to be available in volume quantities before 1979.

This Japanese development was reported by Japan's Ministry of International Trade and Industry (Miti). The Miti project is comprised of five mainframe computer makers which were recently restructured into two groups: the Fujitsu/Hitachi/Mitsubishi and the Neac/Toshiba groups.

The Miti project has a budget of approximately $400 million and will concentrate on very large-scale integration (VLSI) logic and memories and other circuits. The Miti total budget over the 1977-80 period should approach $100 million for this VLSI activity alone, while an additional $190 million will be spent on a "fifth-generation" computer and about $117 million will be allocated to pattern information processing R&D.

Optic Communications Links

The significant advantages of fiber optics in computers include wideband width in the microwave range, no electronic interference, electronic isolation and loss of only 2 decibels per kilometer in glass fibers now in use

(Continued on Page 16)

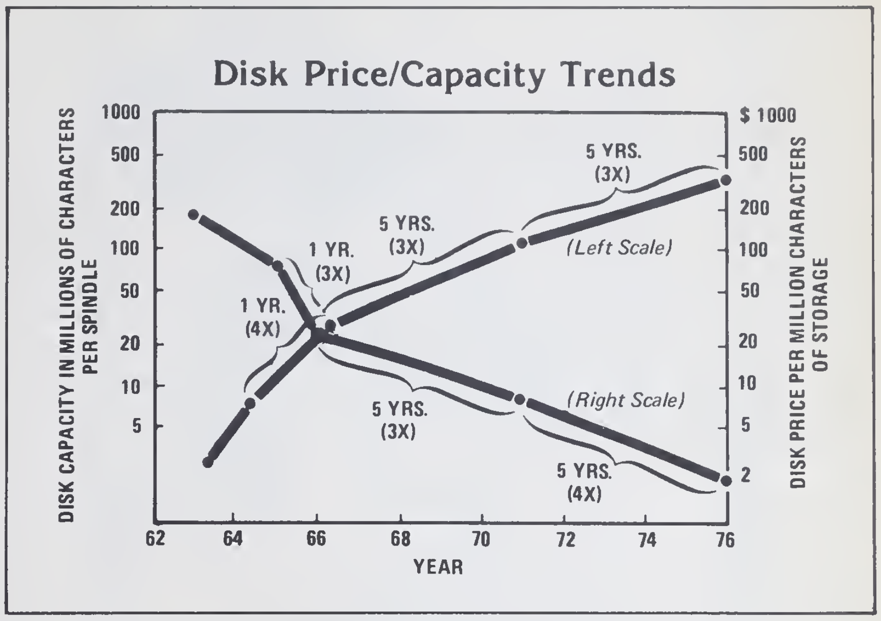
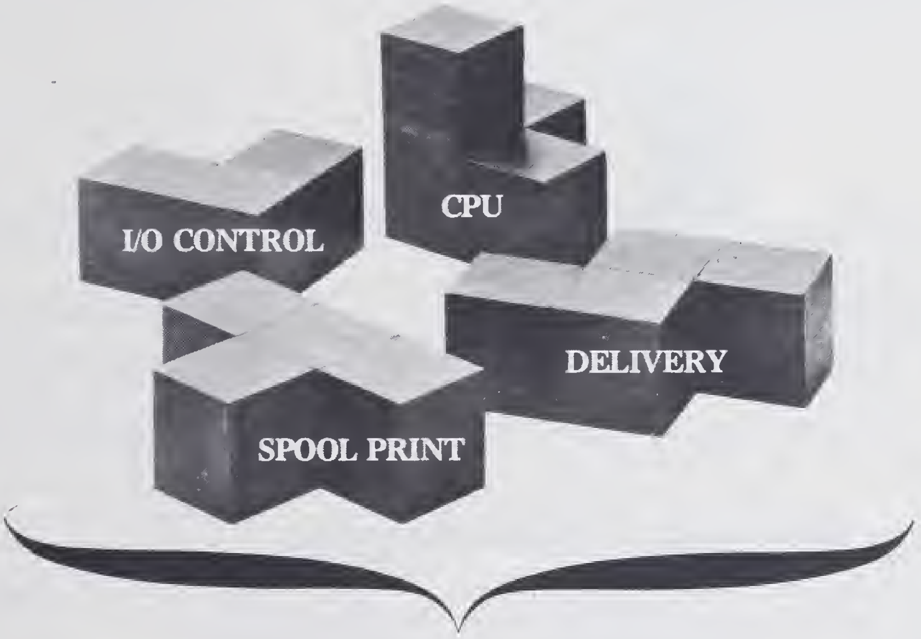
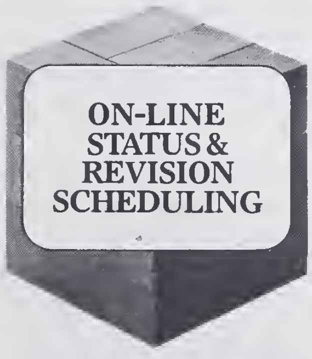


Figure X-9

On-Line Job Status Throughout Your Entire Data Center.



INQUIRY
Job Status •
Abended Jobs •
Entire Network Status •
Overall Production Status •



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- Predecessor Job Abended
- Job on CPU started before I/O work completed
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Users' Report...

"Winning Proposal" Winning Big

A step-by-step guide to proposal preparation is now helping many computer EDP firms score big wins in their proposal efforts. Users of the book, entitled *How to Create a Winning Proposal*, report an impressive 42% average increase in the success-ratio of their proposal projects. Of the companies polled, 68% attributed their successful track record to the guidelines provided in the book.

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Microwaves Sept. 1976

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Convair Managair Feb. 1977

The authors cover government requirements in an overview of the U.S. procurement network, how it works, and how the proposing firm can increase its effectiveness in competing for contracts. Excellent guidelines are given on how to analyze and respond to RFP's, RFQ's and IFB's. Simplified formulas enable accurate costing-out of engineering, R&D, service, manufacturing and production projects.

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In Depth: The Waves of Change

(Continued from Page 15)

(which represents far better integrity than that characterizing microwave techniques).

Some of the work to be done in fiber-optics includes the development of a reliable laser source, fast detectors and new coupling techniques.

The current industry leaders of the above "new" technologies are:

- Electron-beam lithography: Bell Labs, IBM, TI and the Japanese companies.
- Bubble memories: Bell Labs, IBM, Rockwell, TI and the Japanese companies.
- Fiber optics: Bell Labs, Corning Glass, ITT, IBM and the Japanese companies (Fujitsu, Hitachi, NEC, etc.).

Subsystem Technology Forecast

Diskettes will have increased capacity through a combination of greater density and the ability to record on both sides. These improvements will increase effective capacity more than fourfold to over one million characters.

Current and future terminals (IBM "Orbit/Trinity") and other small systems will use the floppy disk.

In addition, stacks of floppies (hundreds) may be used as a low-cost, high-capacity alternative for archival storage.

Medium-Capacity Disk

"Gulliver" is IBM's code name for the new fixed disk that is currently integrated within the 3790, 3600 and other terminals. We can expect this important device, with a current capacity range of 5 million to over 27 million characters, to play a major role together with removable diskettes in future small business systems, minicomputers and other intelligent terminal products.

The recording density, speed and other attributes of the announced Gulliver file are unknown at this time. A 50M to 100M-character "Gulliver" file is anticipated before 1980, however.

Large-Capacity Fixed Disks

The original IBM code name for this nonremovable device was "Apollo." It is to utilize newly improved multilevel recording techniques, increasing capacity to 11,000 bit/in. and about 800 track/in. Such a device would accommodate in excess of one billion characters per drive.

IC multielement heads would be used (Burroughs has already announced its own, new IC-head device), and average positioning time would probably be in the 10 msec to 15 msec range.

This disk, together with the IBM 3350 and improved versions of the 3344 (more read/write heads), should be available on both the 370 series and System/80. Announcement of the "Apollo" is anticipated for 1978, with deliveries to follow in 1979.

Disk improvements in terms of capacity/$ were significant in 1965 (threefold improvement) and have been accelerating again during the past five years (see Figure X-9).

Texas Instruments' Silent 700 terminal uses 92K-bit bubble chips and Hitachi has a point-of-sale terminal which also uses bubbles for storage. IBM has built a device incorporating bubbles 1 micron in diameter with access times approaching 1 msec to as low as 100 microsec depending on the configurations and loop lengths.

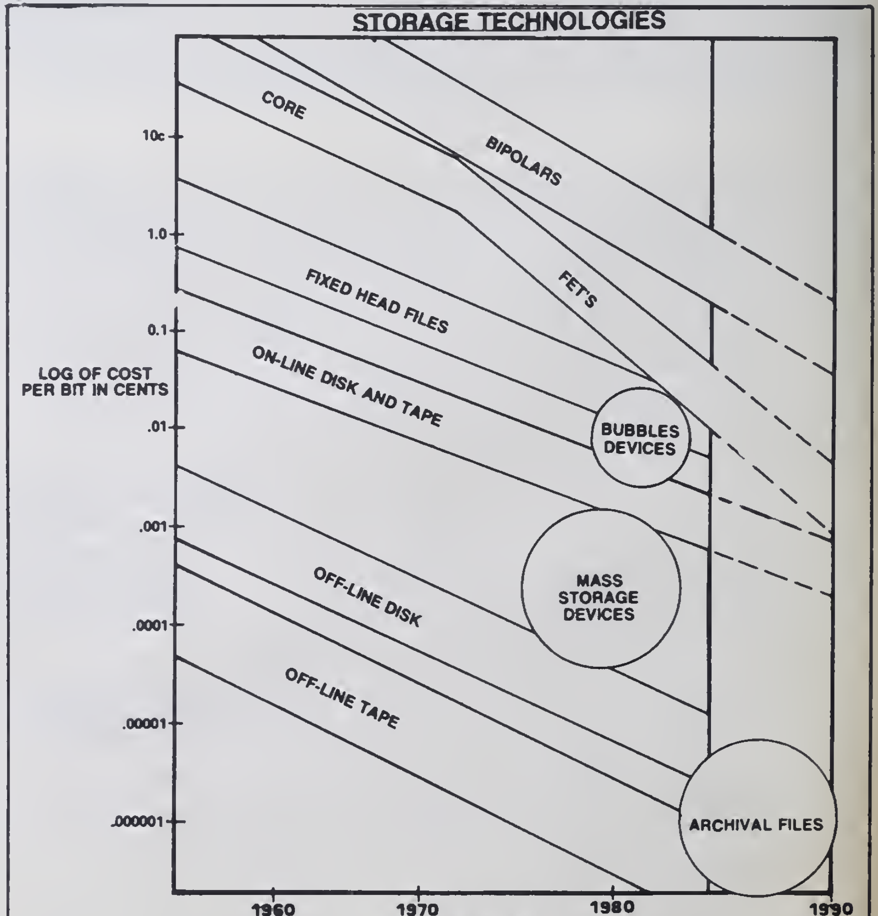

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Figure X-10

Bubble size appears to be material-dependent. The packing density is dependent on the line size that can be laid down on the bubble material and is also dependent on the exigencies of photolithographical technique.

In contrast to CCDs, the bubble process is more complicated and, according to IBM, bubbles are being directed toward analog device uses such as scanner applications.

The economic cross-over point for some additional applications for bubbles will occur in 1978 (.1 cent/bit, 1M-bit capacity) and 1980 (.03 cent/bit, 3M-bit density). During that period, fixed-head disks and some diskettes will be replaced by bubble devices.

Nonimpact Printers

A magnetic ink-jet printer was recently introduced by IBM for the office equipment or word processing business of its Office Products Division. This device has a print speed of up to 92 char./sec, but is relatively expensive.

More ink-jet printers of higher speed are expected to be introduced over the next five years. Devices with speeds exceeding 200 char./sec which incorporate multielement ink-jet heads can be anticipated.

Advantages of ink-jet devices are better resolution, enhanced print quality, lack of noise and potentially higher reliability.

Mass Storage Devices

Additional versions of the IBM 3850 are anticipated — a larger model with twice the current density (or 940 billion characters) and a smaller version for the 370/138 and 148 systems are expected to be introduced by 1978.

Within the System/80 timeframe, a 4X capacity model should be available and other advanced structural improvements can be forecast: the use of bubbles or CCDs as another level in the storage hierarchy; faster staging disks (more read/write heads); and, most important, a cache-type buffer.

Figure X-10 attempts to put all the various storage technologies together so one can appreciate the distinct spectra of capacity and cost and the relative improvements over time (past, present and future):

(1) Mosfets will dominate and cover most on-line, high-speed main storage needs during the next 10 years.

(2) Bubbles should replace most fixed-head disks, drums and diskettes by 1980.

(3) Moving-head disks will continue to improve in capacity and cost; no replacement device is anticipated for at least 10 years.

(4) Mass storage devices (e.g., the IBM 3850) of various designs are quickly closing the "gap" between on-line disk/tape and off-line disk.

(5) Archival files are anticipated by 1983-85 as a cost-effective replacement for off-line magnetic tapes and disks in terms of easier access, speed and equivalent price per bit.

Gas Panel Displays

Some plasma displays have already been introduced by both Burroughs and IBM, in particular the IBM 3600 financial terminal. Additional displays of this type are expected over the next five years.

IBM plans to build a 14-in. by 14-in. panel with multilevel addressing techniques to reduce the cost of drivers.

Advantages of plasma displays are high resolution, flicker-free operation, greater reliability, inherent storage (no requirement to refresh the display screen) and multicolor capability.

The Waves of Change *is on the presses and will soon be available. Those wishing to acquire copies of the book can direct their inquiries to Carl Menkel at Advanced Computer Techniques, Inc., 437 Madison Ave., New York, N.Y. 10022.*

The flat design permits them to be used in many unique arrangements for terminals or consoles.

Josephson Technology

A thorough review of recent IBM technical publications, systems journals and a tour of the T.J. Watson Research Center suggest that the successor to System/80 *can* emerge by

(Continued on Page 18)

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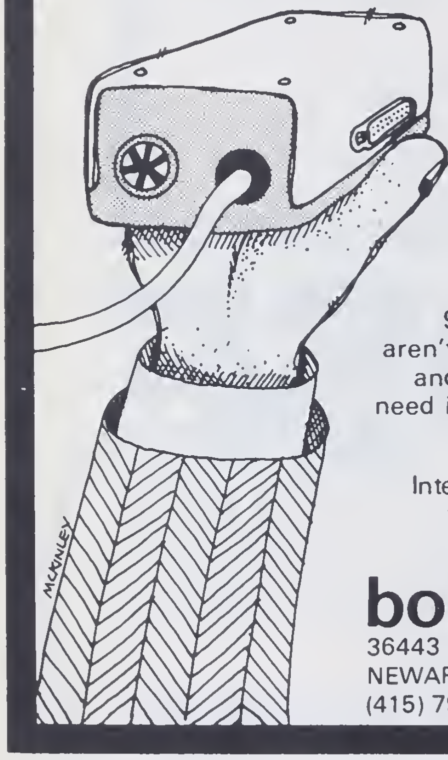

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In Depth: The Waves of Change

(Continued from Page 17)

1985-87 (if IBM decides to announce it in that period) and that the successor mainframes (CPU and memory) will be far more revolutionary with respect to System/80 than System/80 will have been relative to System/370.

The technological breakthrough underlying this phenomenon is called "Josephson Tunnel Junctions" (named after Dr. Brian Josephson, who discovered the Josephson effect in 1962).

Josephson devices (logic and memory) are superconductors which operate at the temperature of liquid helium (4.2° Kelvin), with switching speeds in the picosecond range (100 to 200 times faster than today's fastest semiconductors).

They are of three-layer, laminated construction with outer layers of superconducting materials separated by an insulating layer, and they generate only one-thousandth as much heat as do current techniques.

The entire Josephson computer including memory (but excluding I/O devices) may be encased in liquid helium with an outer chamber of liquid nitrogen. Recent technological fallout from the National Aeronautics and Space Administration program has solved most of the cryogenic technical problems. IBM has been actively working on Josephson devices for over six years.

The key questions are *not* technical (although some problems remain to be solved), but rather:

- Whether IBM corporate management will decide to impact System/80 in the 1985-87 timeframe.
- Whether it makes good business sense to offer this kind of horsepower (i.e., whether the marketplace can absorb it or whether a 100- to 200-fold performance increase will saturate the marketplace.
- Whether future peripherals can keep up with superconductor technology (or how "balanced" systems can be created).
- What the competitive environment will be like during that period.

Josephson capability is *not* limited to large-scale, high-priced processors — the technology can cover a very wide spectrum of systems; it is, in fact, a very small (physically speaking), large-scale computer.

A Josephson multiplier was described recently in the *IEEE Journal of Solid-State Circuits* and in the May 1976 issue of IBM's *News/Research*. The multiplier, the most complex Josephson circuit yet presented in the literature, contains 45 gates (a gate performs a single logical operation such as "and" or "or"). Projections indicate that two 4-bit numbers could be multiplied in 12 nsec.

The product of power dissipation and delay per logical operation, a standard figure of merit in switching circuits, is about *1,000 times better* in the Josephson multiplier than in present semiconductor circuitry. Furthermore, reported detailed test results indicate in the *IEEE Journal* "the various design considerations — signal levels, timing, impedances — are sufficiently well understood to provide high performance and reasonable tolerances. The tests also confirmed the substantial progress that has been made in fabrication techniques for sizable arrays of Josephson devices and supporting circuitry."

According to Dr. Eugene Fubini, a private consultant on science and technology (former IBM vice-president and group executive responsible for research and advanced systems development from 1965 to 1969), "in seven to eight years (1983-84) we should expect 10,000 times greater performance (from Josephson technology) ... a megabit storage chip will cost approximately $30 by 1985."

Advanced Computer Techniques, Inc. believes 10,000 times greater performance is *not* probable at that time; however, a 100- to 500-fold improvement *is* practical by 1985, and this is

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Not unless you have a system that can post pension hours one for one, with hours actually worked and paid, including vacations, jury duty, layoffs, and military time.

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WANG

In Depth: The Waves of Change

sufficient to change our "style" of programming.

These incredible speeds and capacities will dramatically change the way we program future computers. There will no longer be much concern about efficient code or wasteful use of main memory.

In fact, programmer/analysts can try *all* possible solutions to a problem since it takes a few nanoseconds per try. Trial and error, interactive programming and analysis would increase greatly with this kind of capability and drastically change the way we create software.

Fubini also states that while "in the past we were problem rich and solution poor" Josephson technology will reverse the situation, making us "solution rich and problem poor" in the near future.

The initial markets for Josephson devices and computers will likely arise in connection with federal government projects, military applications and weather forecasting and eventually spill over into the commercial section by 1985-87. A key question is how we can utilize (program) this technology effectively when one second of computer time may take a thousand man-years to program.

I believe that any advanced system planned for shipment in the 1979-80 timeframe must reflect an awareness on the part of the vendors of the impact of Josephson technology in 1985-87. Will the hardware and software architecture of the 1980s be adaptable to Josephson technology? Will the major manufacturers invest sufficiently in this revolutionary technology to remain competitive in the 1980s? What new programming techniques will be necessary to tap this incredible resource?

Computers are today just beginning to affect our lifestyle, and we have probably reached the point where we cannot return to the manual information-handling process in many application areas — in airlines reservations, process control, command and control, etc.

While it may yet be possible to argue that if you destroyed all the computers in existence today it wouldn't *seriously* affect your life, it seems equally obvious that by the early 1980s we would be drowning in paperwork. Progress would necessarily retreat without the powerful computer systems and networks upon which a service-oriented society is — inescapably, we would say — dependent.

Nor is this an alarming picture. Computer technology can directly help to solve the energy crisis and pending natural resource crisis. Some examples: paper will become the exception medium for human communications, being replaced by on-line storage and retrieval devices; microprocessors will improve transportation efficiency, reducing fuel consumption; there will be less need to travel when low-cost computers and networks permit effective human interaction from a terminal in the office or home.

And products — appliances, automobiles and other machines — can be designed to last longer (through microprocessor failure prediction/-detection and self-repair/adjustment), thus reducing or at least holding the line on the amount of energy and natural resources required to manufacture a product — the current "planned obsolescence" game will itself become obsolete in the face of resource shortages and the resulting demand for products with built-in "survival" factors of two to five times current product life expectancy.

Of course, the fact that we *can* do something doesn't mean we have the will to do it. However, the expected shortages of most of the world's prime resources will generate an almost irresistible demand for more intelligent, *purposive* usage of such of those precious resources as remain.

Thus, on one level, the demand for computer storage and easier access to vital data will ensure a new generation of dramatic growth in the computer industry (however altered in shape and character the industry will be by the mid-1980s). But most important of all, this growth will be one of the fundamental factors in ensuring the survival of the community of man, in a way that makes the prospect of survival less grim than it otherwise might be.

The computer industry can and must be in the forefront of a movement away from artificial services and toward necessary, truly life-enhancing ones. It will be good — and gratifying — to participate in an "industry trend" with such potential.

Lecht is the author of four previous books on computer-related matters.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and the Data Processing Management Association.

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Now...

Digital has a new RM03 disk pack with 67 megabytes. Digital has reduced the prices of its terminals. And it has a new packaged system configuration for more savings!

The basic system now includes the same PDP-11/70 CPU with the same 256 kilobytes ECC MOS memory. The same TE-16 mag tape and controls. The same RSTS/E operating system. But it also includes the slightly smaller RM03 disk pack. Packaged price: $103,300. Four VT-52 "four-packs" sell for $6,000 each. Total price: $127,300.

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Now...

Digital has reduced the price of its terminals. Digital has also introduced the concept of packaged systems, standard configurations that permit the passing along of manufacturing savings.

The basic system now is identical to what it was before October 17. But the packaged system price is now $10,000. An 18% reduction.

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Editorial

Voice of the User

It is unfortunate that many of the major telecommunications issues are decided without input from users. All too often, these issues are debated in an atmosphere where only the interests of common carriers and vendors are adequately represented.

Because the user viewpoint is so often missing, it often gets neglected in the deliberations of regulatory and legislative bodies.

Recently, however, a large user organization has begun to make the voice of the user heard where it counts. That group is the Tele-Communications Association (TCA), which appears to have embarked on an active program of speaking out on communications issues affecting the interests of users.

In recent months, the TCA has taken a position against the concepts of the AT&T-sponsored Consumer Communications Reform Act, favoring instead the continued policy of competition begun by the Federal Communications Commission (FCC). In support of this policy, several delegations from TCA have visited Washington to meet with policymakers in Congress and at the FCC.

Although it may seem quite normal for the TCA to speak out on important issues, the organization underwent some internal soul searching before its members were convinced that a more active role was in their best interest. This policy of speaking out on the issues will give users a much needed representative in Washington and elsewhere when important telecommunications issues are being debated.

A user organization speaking out encounters difficulties because many of its members are businesses which may have taken corporate positions. These corporate positions may not always jibe with the feelings of a majority of the members on a particular issue.

But TCA appears to have faced this conflict and decided that silence can be even worse for user interests than some disagreement within the ranks.

Unlike some other user groups which avoid facing this issue by prohibiting organizational positions, TCA has become a refreshing force in an area where the user is heard all too infrequently.

Daniel Grove, the newly elected TCA president from Motorola, Inc., shows every indication that he wants his organization to continue to speak out. Although in the long run this policy may trouble some individual members, in the final analysis it will make TCA vibrant and responsible, bringing the views of the user to those who most need to hear it.

It is to be hoped that TCA is afforded every opportunity to have its positions publicized and that it receive the support of users, both members and nonmembers, in its efforts.

The very future of telecommunications in this country is now being debated in Washington. This question is too important to be left to the vendors and carriers alone.

TCA is doing precisely what is needed to protect the interests of users. For this effort, the group needs input and deserves both encouragement and support.

Data Past

Five Years Ago
Oct. 18 1972

NEW ORLEANS — The FBI requirement that computers be dedicated to law enforcement in order to access its Computerized Criminal History (CCH) files was called a "power play" by DP experts and criminologists meeting here. Panelists and audience members at the international crime symposium contended the requirement did not ensure the security of data.

— — —

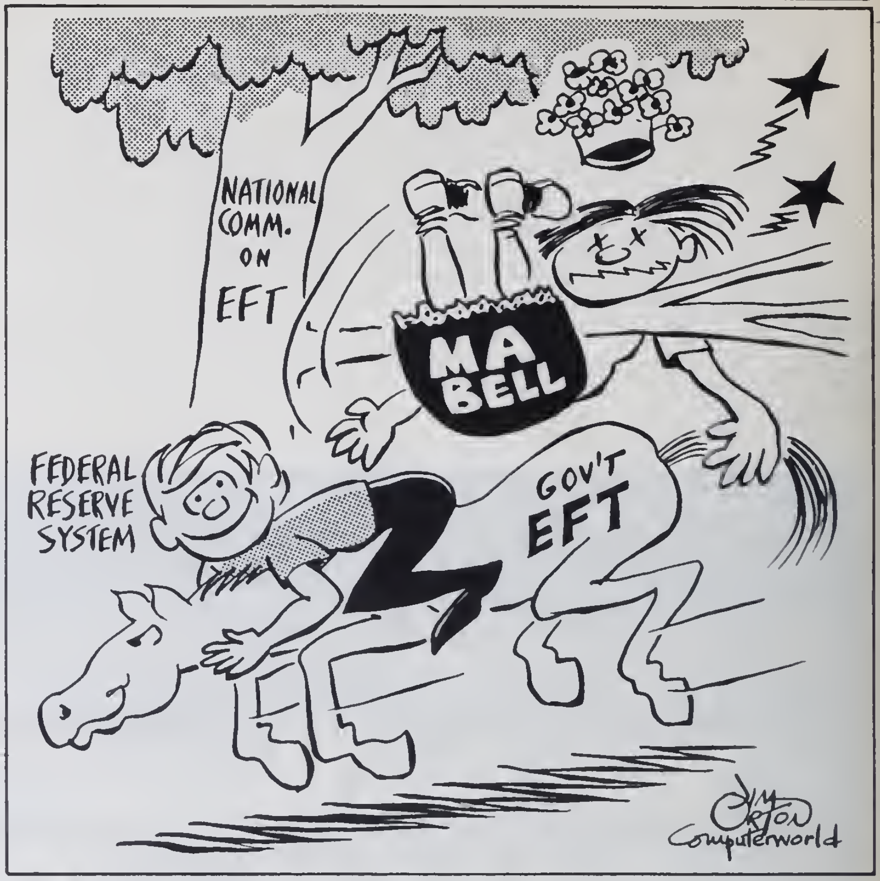
NEW YORK — After four years of training, IBM and the government put on their antitrust boxing gloves, but the manufacturer preferred to wait until after Nov. 7 for the heavyweight match. Nevertheless, a federal court judge here refused IBM's request that the government wait until after the election to list its goals in the suit and instead called for the parties to appear Oct. 16 so the Justice Department and IBM could make formal statements.

Eight Years Ago
Oct. 22, 1969

WASHINGTON, D.C. — The user costs of information processing would probably rise 100% within five years, a market research executive told the Law of Software Conference here. But the increase would be reasonable because expenditures would be relatively low, according to Patrick J. McGovern, president of International Data Corp., who said the increase would result from emphasis on better software as the user accepted more responsibility for the efficient operation of his system.

— — —

EL SEGUNDO, Calif. — Xerox Data Systems (formerly Scientific Data Systems) adjusted prices and lowered some rental rates. The biggest cut was in one to three-year rates. Prices dropped an average of 5% with some reductions as high as 14%, Xerox said.



Letters to the Editor

In Defense of the NCIC

I read with concern the editorial in the Sept. 19 *Computerworld* in which you raise serious questions as to the overall worth of the National Crime Information Center (NCIC), as well as the FBI's management of the system.

Law enforcement authorities are uniformly enthusiastic in their support for a telecommunications network that deploys computer technology on behalf of law-abiding society in the war on crime. Your assertion that the NCIC is in "the hands of the FBI" does not take into account the fact that there is a tremendous input from the entire criminal justice community.

The NCIC Advisory Policy Board, comprised of 26 top-level criminal justice administrators, has the responsibility of making recommendations to the Director of the FBI pertaining to general policy, concept and operational principles of the NCIC. Twenty members of the board are elected by the NCIC users across the entire country. The remaining six are appointed by the Director of the FBI.

As I am sure you know, NCIC computer entries are made by — and always remain the property of — a broad spectrum of local, state and other federal law enforcement agencies throughout the U.S., the Commonwealth of Puerto Rico and Canada.

The FBI certainly acknowledges its responsibility as manager of the system and to that end, in order to assist in maintaining timely and accurate NCIC data, provides printouts on a regular basis to each participating agency for validation of records in the system. The initiating agency furnishes written certification attesting to the accuracy of that agency's NCIC entries.

Augmenting this ongoing validation process are automatic computer edits, internal control samplings and automatic purging of records after the passage of a prescribed period of time. We are firmly convinced that these procedures, handled jointly by the FBI and the participating agency, enable the system to function with more accuracy than that implied in your editorial.

The editorial characterized as unimpressive a "hit" ration derived from 250,000 transactions daily in a system consisting of more than 6.5 million records. Those 250,000 transactions, however, include new entries, deletions, modifications — transactions the very nature of which could not possibly yield a "hit."

While on this subject, I would strongly emphasize that a negative response can be of great value to a law enforcement officer in certain situations. Further, positive responses obtained daily from the system are invaluable to law enforcement in the areas of fugitive apprehensions and in the recovery of stolen property.

For your information, the study which was the basis of your Sept. 19 editorial was the result of a two-hour orientation briefing and tour of the NCIC facilities. We in the FBI have no objection to an in-depth study of the NCIC; we are convinced that such a study would rousingly confirm the NCIC's efficiency and effectiveness as an anti-crime tool.

And so long as the NCIC daily dispenses numerous items of information relating to the whereabouts of fugitives from justice, stolen property and missing persons, its necessity is readily apparent.

Clarence M. Kelley
Director
Federal Bureau of Investigation
Washington, D.C.

(Other letters on Page 26)

Maintenance Appraisal Critical In-House Job

By Jack Stone
Special to CW

The concept of DP "management perspective" (or the lack thereof) has always intrigued me. Often in our workaday DP world we are so trammeled by the crisis-of-the-moment that we lose the precious insight to view the DP world as it truly is.

Let's take a case in point — something as hard-headed as hardware maintenance. And let me ask you a few rhetorical questions.

Do you know for a fact that during preventive maintenance time the technician is not causing .more problems than he is curing? Do you have the objective basis for determining that one vendor's disk drives are better maintained than another's? Does your installation have standards of reliability performance, based on history, to help determine whether or not you bought yourself some lemon-styled system components?

If you are one of a select group of 99% of the DP management population, your response to all three questions more than likely is, "Why hassle me about maintenance? I contract it all out to my friendly vendor and he's doing a grand job."

"Gotcha!" I say. "Prove that he's giving you a gold-star performance — and I mean facts and figures!"

"Now look here now!," you say. "I pay him good and plenty money to keep those boxes buzzing. Equipment up-time is *his* responsibility!"

If the foregoing is your response, this is where dear reader, you and I part company. Because management is your responsibility, pure and simple. You contract out the implementation because the vendor has skilled personnel on board whose services you can buy at less cost than supporting an in-house staff. But you still have the responsibility to structure the maintenance plan and control its execution. *You* have the responsibility to maintain proper records to gauge for yourself the performance of both the vendor equipment *and* service personnel.

To obtain an expert's viewpoint, I interviewed George White, coowner of Tagg Associates, an Arlington, Va., software firm and one of the brightest innovators of information systems for computer center management.

Q: As I recall, most airlines, steel mills and railroads have their own in-house maintenance force. Computer installations, in effect, abdicate their responsibility in this area. Why?

A: A lot of it has to do with history and tradition. Maintenance management is seen as just another headache which can be adequately handled by an outside vendor.

Q: But is the function being properly handled?

A: Sorry to say, very few installations have an objective basis for determining the quality of the maintenance vendor's work. They neither have standards of reliability nor organized methods for obtaining objective measurements of reliability. And maintenance contractors are not known for their willingness to share reliability information with their customers.

The Human Connection

Q: What can the installation do to wrest back some of the control it has lost?

A: First, DP management must change its perspective on its responsibility for maintenance. It should understand that, through appropriate management action based on proper information systems support, it can improve reliability performance by improved control over the maintenance contractor.

Q: But don't customers meet regularly with their maintenance vendors to discuss problems?

A: Sure they do. But when you take a broader outlook, what's actually happening is that the customer is complaining about how badly the vendor is managing the customer's maintenance program. He usually doesn't beef about the quality of technical personnel. Of course, you see the problem immediately — no vendor can possibly have the same business objectives as the customer. And, as you can expect, most customer yelping improves matters for a while, then support may start to fall off again.

Q: What type of information systems support do you see as necessary for the DP manager?

A: Well, in brief, the DP manager must maintain a comprehensive data base of his hardware failures, by type, how often, by device class and unit and address. Vendor personnel performance must also be recorded. Reports can be generated, given such information as failure data on each device, failure trends, best/worst devices within class, etc.

Q: I presume that the same data base can be used for analytical reports.

A: Of course. In fact, we have a software product for reliability support that not only provides the data base of reliability information but can generate reports that permit objective comparisons among vendors' equipment and maintenance personnel. Obviously, such data taken over long periods can help develop local standards of reliability performance but, more important, can help establish industry-level standards of reliability which everyone (except possibly the hardware vendors) agrees are sorely needed.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

Public Needs Helpful Overbooking Figures

The Taylor Report

By Alan Taylor CDP

Eastern Airlines has used its overloaded ratio (passengers rejected/-passengers flown) to challenge the other airlines. It has started the next step in the saga of getting the computer decision-making age started properly. I mean "computer decision making" as opposed to merely computerized arithmetic, which is the level of most computer "decisions." Computer decision making, as far as deliberate overbooking systems operate, involves at least one elements of computer-decided number — the forecast of how many seats on a given plane will have been reserved for passengers who won't board the flight. Of course, the rest of the work — the allocatio of "confirmed" seats for flights that are already full — is arithmetic in nature, but the application itself isn't.

The overbooking algorithms have survived through a number of stages. Originally, their very existence was covered up, and "computer errors" were used as the excuse when someone couldn't be boarded.

Then came the second stage. The public was kept in the dark about what was going on, but the regulatory body, the Civil Aeronautics Board (CAB), was fully aware and generally supported industry in withholding information from the public. The "public interest," according to the prevailing attitude in the department, was better served by getting money to the airlines so that they could lower their fares.

I never saw any explanation as to why the public was not told about what was happening, but in the industry the idea seemed to be that the passenger would simply book with another airline that didn't tell him. And, as far as I can make out, that really was, and to some extent still is, the reason why so little is coming out, even now.

Of course, this year the third stage has arrived — the public knows. Under CAB orders, disclosure that deliberate overbooking has been taking place started as simple notices in ticket envelopes.

Now these notices are short essays that disclose what is going on and try to reassure the passenger and rationalize the situation.

Eastern's Scapegoat

Eastern uses a little bit of exaggeration in its rationalization. It claims that "invariably" some people don't take the seats they book. I doubt that very much. There must be some, if not many, occasions when all the booked passengers arrive at the loading gate. I certainly don't mean that many flights are never without no-shows, but to make this "invariable" claim is really no more than to make the "other" passengers into scapegoats.

The airline doesn't mention late planes missing connections, or anything like that. Eastern has quite often made me late for planes and other engagements — and I think the airline's role in no-show should be brought out in any future rationalization.

In the rest of the explanation, it claims that the number of overbookings can be accurately calculated and can be allowed for in flight planning. Then it goes on to claim that Eastern's record (two rejected in 10,000 passengers boarded) is better than that of any other major airline.

Well, I don't know if we are soon going to see an airline "war" of how few denied bookings one carrier can have — rather like the cigarette tar war or the gas mileage wars that have come about with the use of government figures and testing methods. It is possible and is certainly in the cards.

However, I hope some more constructive information will be available first, because figures like "two rejected in 10,000" are simply inadequate. They do not address the question of whether overbooking is worthwhile or not.

The question is how many of the people who were overbooked as the flight prepared to take off (not counting those seated as a result of cancellations) were boarded and how many were not. Inflating the number of passengers affected by adding in the number of passengers carried on flights that had no overbooking; and including the passengers who were boarded, but who might not have been, on the overbooked planes just makes the numbers an apple-and-orange comparison.

However, what really is missing is some idea as to which planes are likely to be overbooked. For instance, is the last plane at night out of Toledo ever overbooked? Even on Christmas Eve?

In fact, there is no doubt that overbooking is a success and that it will continue in many or most cases where it is being used. Efforts to improve the quality of overbooking algorithms are most meritorious, and if the use of figures in publicity helps improve the algorithm quality, then I'm all for it. But I think that the quality of the suffering caused in various cases is what has to be brought out, rather than simply the quantity.

What about it, Eastern? Care to come up with some real innovations to help the sufferers — and to give us statistics on the numbers of people who are really affected by overbooking to compare with the number that you have to refuse?

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Letters to the Editor

Working for a Living

I was very interested in Reed Lawlor's letter ["Cartoonist Needs Debugging," CW, Sept. 19] especially because he didn't like the implication that copyright lawyers "are only interested in the money they can collect for rendering services." This seems like a fairly reasonable description of working for a living — unless, of course, attorneys are now working for the fun of it, or out of a feeling of responsibility to the DP industry, and not for the fees.

While it's true that one can write to the Register of Copyrights, that office is paid (from tax dollars, of course) to help. It is not a law office engaged in earning a living by providing services. To draw a parallel, just because you know where you can get a free book on the causes and cures for medical problems, that doesn't mean doctors aren't interested in their fees.

I've been a DP professional since 1956 and an attorney since 1963 and hence attended the first conference on "The Law of Software" in Washington, D.C., in 1968. Most of the talk (and many of the speakers) concentrated on the fees that could be collected. They stressed that if patents for software were to become a fact, an enormous new field would become available.

I've seen nothing to indicate a change in this attitude. I don't know of anyone who wants to be deprived of income by "do-it-yourself" competition.

This may be one of those not unknown DP situations where a supposed program bug is in fact just bad input data.

Henry F. Herre
San Francisco, Calif.

Surprise, Surprise . . .

Imagine my surprise upon reading Jeff D. Murphy's ringing denunciation of the Certificate in Computer Programming (CCP) examination as a "cliquish vanity" that "makes money for its creators" [CW, Sept. 26], since the Institute for the Certification of Computer Professionals (ICCP) is a nonprofit corporation.

Equally surprising was the statement that there are about 10,000 holders of either a Certificate in Data Processing (CDP) or a CCP, because the very first CCP examination won't be given until the end of October. (There are actually about 16,000 CDP holders.)

I was surprised that Murphy asked how many DP managers consider it important that their programmers be conversant with professional ethics and legal considerations. As a DP manager, I assure you that my programmers had damn well better be!

I was astounded when I read that Murphy thinks the CCP is an attempt to substitute "education attainment for demonstrable ability." After all, the *CCP Announcement and Study Guide* very clearly states: "While no specific educational or experience requirements must be met in order to take the examination, a candidate who does not have extensive experience will find the examination to be extremely difficult."

Then I read the editor's note which said: "Murphy is a marketing manager . . ." and I wasn't surprised.

Bob Brown
Atlanta, Ga.

Vain, Maybe; Cliquish, No

I am responding to Jeff Murphy's Sept. 26 article on "Cliquish Vanity." I am one of the "one half of one percent," according to Murphy's calculations. This slip of his perhaps indicates what he would like to wish for. The fact that he nevertheless took the pain to warn against "the destruction which awaits" him, is an indication that he feels the figure is higher than that.

By coincidence, the same issue of Computerworld contained a front-page article stating that DP salaries were up last year by only 5.1%, an increase lower than the inflation rate. That figure, better than anything else, suggests that the demand for programmers is slowing down. The amorphous mass of people who have been brought into the profession will lead to internal differentiation, as happens in many natural systems.

In the absence of real salary increases, the people who were unable to graduate into management after their third Cobol program (and, as a result, had a chance to learn the distinction between global/local), will seek some measure of their "real ability." To measure this real ability and the productivity of programmers is an extremely difficult job. Few managers can do it and I am not sure that Murphy can. Why not then let the specialized institution do it and tag the people who pass the exam as certified data processors (CDPs), certified computer programmers (CCPs) or whatever.

Vanity? Maybe. But cliquish it is not. The exam is open to anybody, and it gives an outlet for unused energy to the people who take the exam — energy that they otherwise might use to compete for Murphy's position. But they probably don't want to; maybe they want to do a better job for their managers and for their companies.

Henry Pikner
New York, N.Y.

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Or an operat

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Then, we gave it a longer-lasting raster scan (TV) type display. To produce faster, brighter, flicker-free images. To give you sharper, black-and-white graphics. And to totally eliminate time-consuming image redrawing.

By contrast, most graphics terminals in the field today (with storage tubes) are about as far from interactive and intelligent as you can get.

Dependent is more like it. Because, typically, every graphic image — and every graphic manipulation — has to be carefully calculated, then transmitted, by the host computer to the waiting graphics terminal.

This whole routine not only puts a tremendous burden on the host computer (which usually has other jobs to do) but routinely requires lots of special software.

With storage tube type terminals, even routine manipulations like panning, zooming, selective erasing and message changing aren't very fast. In fact, the terminal operator is required to wait — up to several minutes — for a previous image to be completely erased and the second image to be tediously redrawn.

You get the picture, all right. But you'll get it faster with the new CalComp IGT-100. Because the IGT-100 is the quickest solution to these traditional problems. And easily, one of the most affordable.

Thanks to our built-in microprocessor, efficiency doesn't get lost in the shuffle.

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Coupled with 12K bytes of RAM memory, the IGT-100's microprocessor permits local storage, manipulation and completion of display functions. While providing an addressable memory matrix of 1024 X 680 bit positions. And a viewable matrix of 416 X 312 positions.

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Unlike most other graphics terminals, the new IGT-100 can store and manipulate images on a totally local level.

That means once an image is transmitted, you've got complete, autonomous control. All planning, selective erasing and message changing is instantaneously handled by the IGT-100's built-in microprocessor.

Even write-thru's, grids and zooms (2x, 4x, 6x and 8x) are displayed on the screen within 1/10th of a second.

And all without tying up your host computer. Or waiting several minutes for the image to be redrawn on a storage tube.

In fact, working with its built-in microprocessor, the IGT-100's longer-lasting raster scan screen will beat a conventional storage tube every time. Delivering a faster, brighter image at a flicker-free rate of 60 frames per second.

And that's a mighty pretty picture — any way you look at it.

Who Cares What an EXCP Costs?

Perfect Chargeout Just Not Obtainable

By Lawrence H. Cooke Jr.
Special to CW

Probably the hottest issue in DP today is chargeout. Users and DP professionals alike have discovered the cost of data processing is like other costs of doing business, such as advertising or buying raw materials. They have found that expenses decrease the bottom line, while revenues increase it.

Well, it was a long time coming. Still, even today, vestiges of mumbo-jumbo cloud reason. The DP professional knows exactly how to charge for services — one simply pays so much per EXCP, for working set occupancy, for disk I/O, and costs are equitably distributed. But that doesn't work anymore.

The objective of this article is not to account for the lash on the gnat's eyebrow; we aim at a more modest and, we hope, more useful target. We propose to show why chargeout schemes have generally failed to satisfy their objectives and to offer a course that should satisfy all but the most fanatical.

To enumerate them quickly, some of the more important objectives of chargeout methods are cost recovery, predictability, understandability, fairness, replicability, efficiency, charge for demurrage (a storage charge for items that inconvenience others by tying up disk, tape, etc.), minimum interference, auditability, priority, cost competitiveness, marketability, rate stability and off-peak economy.

Reader Commentary

Further objectives of some chargeout mechanisms permit extendability to larger computers without changing rates and encourage migration to favored techniques such as data base or interactive systems, all through pricing.

Some methods seek prices that are robust, meaning that a small change in input should not cause a large change in price. Some chargeout systems seek to punish memory hogs or, heaven forbid, card users.

In short, chargeout may be used as a social tool to encourage some practices and discourage others, without regard to actual costs.

The Basics

Putting aside some of the more precious objectives for the moment, most users and DP people would settle for agreement on a few of these objectives. First, prices should exactly recoup costs:

$$(1) \quad P = C$$

Next, prices should be related to volume - and to the user's terminology:

$$(2) \quad P = nX$$

where n is volume and X is the unit of account (for example, transactions, clients, accounts or other quantifiable units known to the user).

Third, costs should be identifiable per unit, i.e.:

$$C = \cancel{n}X = (c_1 + c_2 + \ldots + c_k)\,\cancel{n} \text{ OR,}$$

$$(3) \quad \frac{C}{X} = c_1 + c_2 + \ldots + c_k$$

where C1 are the units of the chargeout, such as CPU time, etc.

Fourth, costs in time 1 should equal costs in time 2, 3, etc.:

$$(4) \quad C_{t_1}\,nX = C_{t_2}\,nX = C_{t_r}\,nX.$$

The volume held constant, each time the job runs it should cost the same.

In summary, prices should recoup costs, prices should be related to units the user understands, costs should be related to the expense of providing services and the costs should remain constant if volume remains constant.

The Paradox

This seemingly simple set of requirements cannot be met because all of these conditions cannot obtain simultaneously. If three of these conditions can be met, the fourth must be false.

The simple paradox of chargeout is that some of these conditions are mutually exclusive. This fact of nature has eluded some of our best minds; they feel that if they can introduce finer levels of detail, they will approach the perfect chargeout.

With today's computers, features such as virtual memory, multiprocessing and automatic error recovery make it impossible to determine costs in a variable mix. There is an error term in equation (3) above that defies measurement.

In a mathematical sense, there are more variables than equations, so a solution is indeterminate. In an intuitive sense, there's more going on than can be measured.

A short illustration may be useful. Three users, A, B and C, share a computer facility. They wish to be charged fairly, but they don't know or care who else is running.

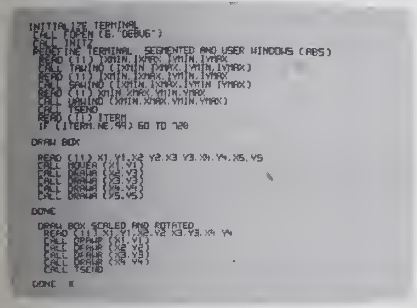
They are indifferent to the presence or absence of others, so long as

(Continued on Page 28)

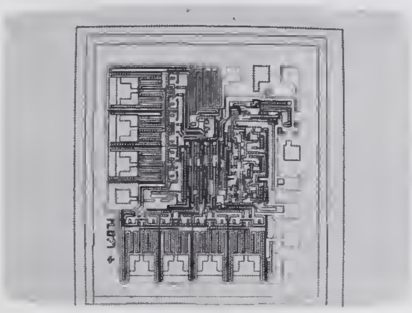
ed graphics terminal
computer's power.
or's patience.

Six images that warrant some serious comparison shopping.

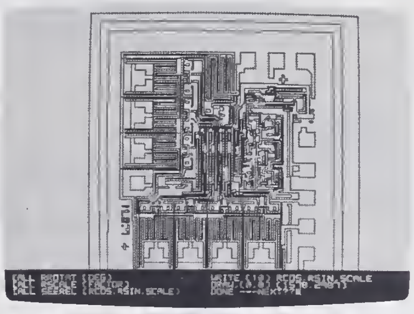
A quick look at basic viewing capabilities and you'll soon discover there's not a more versatile graphics terminal around than the CalComp IGT-100.



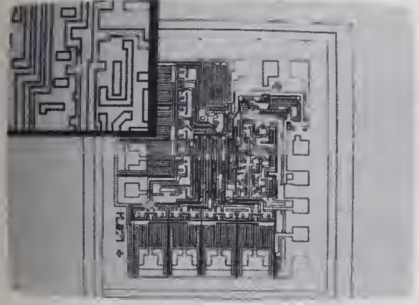
1. All alpha-numerics.



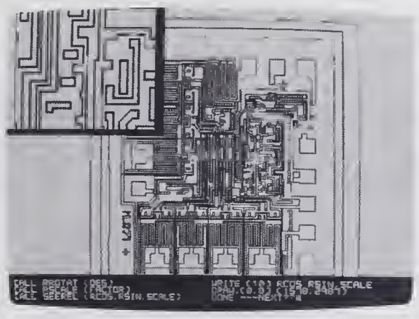
2. All graphics.



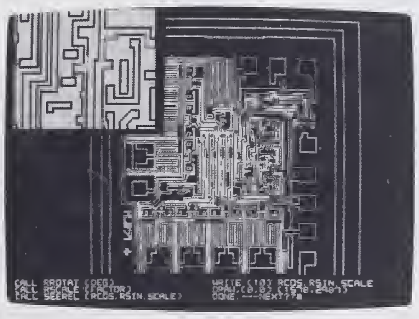
3. Alpha-numerics & graphics.



4. Graphics & View-window.



5. Alpha-numerics, graphics & View-window.



6. Alpha-numerics, Graphics & View-window (with reversed-out section).

To begin with, the IGT-100's special three-way, split-screen design provides you with separate alphanumeric, graphics and view-window sections.

Plus the ability to independently view and control (i.e. panning, zooming, etc.) one or a combination of these sections simultaneously.

Images can even be reversed (white on black) in the graphics and view-window sections.

The IGT-100's basic screen design maximizes the amount of data that can be displayed while providing you with six basic screen arrangements. Annoying superimposed messages have been totally eliminated.

It's about time someone came up with a screen that you can tailor to fit the job — instead of the other way around. And that's exactly what we did.

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Combination	Activity			Cost Units	
1				0	nobody running
2	A	B	C	4	all running
3	A			1	each running alone
4		B		1	
5			C	1	
6	A	B		2.8	any two running
7		B	C	2.7	
8	A		C	2.1	

This table shows the variables involved in a chargeout scheme when three users share a computer facility.

Perfect Chargeout Unreal

(Continued from Page 27)

the price each pays is fair and constant. The above table shows the variables in this simple example. With three users, there are $3^2 = 8$ possibilities.

Some will look at the table and say the condition is impossible. Certain operating systems report to the user that the time expended or charged to him is relatively more constant than it actually is, so the real cost is buried somewhere in the bowels of the computer.

The explanation of cases 6, 7 and 8 is fairly simple: A and B contend for CPU, B and C contend for I/O and A and C are fairly well balanced. Paging occurs, contention occurs, and someone must pay for this overhead when it occurs.

The question is, to be fair, who should be charged what?

Enlightenment begins by not trying to be smarter than we are. We can't predict costs exactly because we don't know what they are. Multiprogramming, virtual storage, error recovery and operating software internal routines have removed the certainty from computers in what they are up to in their nanoseconds.

An error recovery routine, such as bypassing a bad track on disk, performs some tasks that are similar to the human brain. If anyone has marveled at the full recovery of an individual who has suffered a stroke and, after long therapy, regained the use of a hand or leg, he cannot but recognize the loss of efficiency during the recovery process.

Computers are approaching this capacity in a primitive way, and the point here is that the cost of bypassing any aberration is unpredictable. The physical environment within which the problem program runs is constantly changing

Nonetheless, if a perfect chargeout is unattainable, a reasonable one is very much in reach.

Only captive DP shops have a

(Continued on Page 30)

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DATA PROCESSING SECURITY, INC.
Chicago Dallas/Fort Worth Los Angeles New York Washington, D.C.

Battered by Changes, Users Now Full Circle

Reader Commentary

By Jim Ryan
Special to CW

Many years ago, computer systems were so expensive that they were used only by large corporations. Within these corporations the computer user was often a department head; when the corporation decided to investigate the possibilities of computer systems, he called IBM and a very interesting conversation usually occurred.

It went something like this: "!!#$%!! It's simple."

If the potential user didn't become discouraged, he gradually learned about such things as source documents, fields, keypunch cards, calculators, wired boards and printers.

But the user also found the computer wasn't the genius he had believed it to be. The key was in the source documents and wiring of the boards.

The user also found that when he understood the system, he was in command, which was a nice feeling.

The computer systems were all in-house initially and the department heads, usually in accounting, felt quite happy with this arrangement.

One day an engineering department head heard about the possibilities of computer systems as mathematical tools.

The engineer went to IBM and the same initial conversation took place. The engineer persisted, however, until one day accounting saw the engineering department processing punched cards, using its own wiring boards, in the computer room.

Accounting did not object until the time arrived when it couldn't get its job done because engineering was processing *its* job.

Then organization protocol set in, and it became necessary for all departments to process their potential jobs through the accounting department for scheduling.

The first blow to the previously freewheeling user had fallen. The next blow came when a computer department was set up. All departments, including accounting, now had to process their jobs through the computer department, not only for scheduling but also for programming and keypunching.

They were, effectively, locked out of the computer room.

Soon the user's conversation with the computer department resembled his original conversation with IBM. He had two alternatives: to put complete faith in the computer department and hope that all would be well or to update his knowledge of computer systems so he could communicate with the computer department.

In the meantime, technology had moved forward with great strides; solid-state was in and wired boards were out. Most computer systems continued to remain in-house and, for a while, physically transporting source documents or keypunched cards was the "in" thing. Specially prepared storage files were designed for the cards which must not be folded, multilated or spindled.

Before long, however, the user confronted another dilemma as he began to hear more strange languages coming from the computer room. Undaunted, he ultimately translated these languages into words like Fortran, Cobol, hardware, software and peripherals, plus a myriad of other goodies.

The user conquered these terms because computer systems had become a must in any well-run, high-prestige organization.

The computer systems people found some of the users actually understood their jargon, so they moved on to further adventures in science and languages.

The user, reading some of this stuff for the first time, saw not only the familiar "!#%&" but it was followed by (XXX). Once the "!#$%&" had been identified as (XXX), the computer systems experts glibly proceeded to use only the acronyms which they had invented for the occasion.

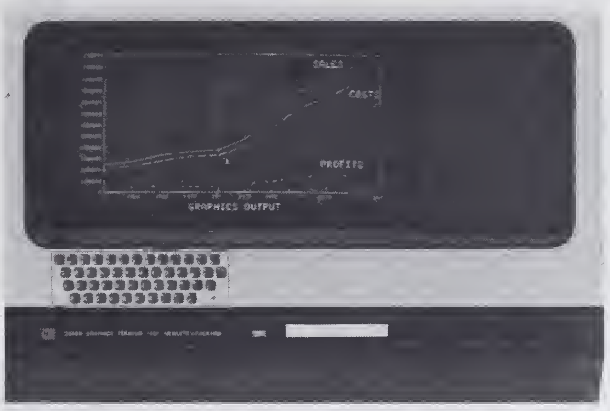
Many users succumbed to the pressure about this time, and their plight is illustrated by the story of the systems operator who said at the climax of a presentation to the user, "I can deliver a report to you every five minutes." To which the user groggily replied, "I'll wait for the next one."

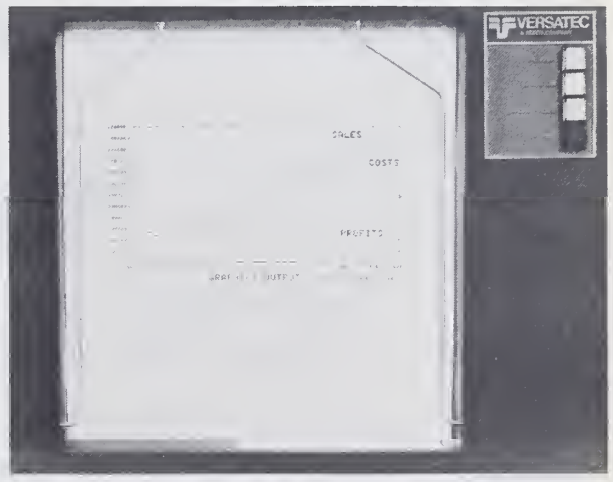
Just as the remaining users were about to give up in despair, technology came to the rescue by bringing the cost of storage and processing down so low the user could sneak into the act again.

The brave user who had survived the flood of languages and protocols found he could access a computer for limited amounts of storage and processing if he obtained a user number and followed the proper protocol.

He could even write, debug, process and obtain printouts of his jobs if he took the time to learn com-

(Continued on Page 30)





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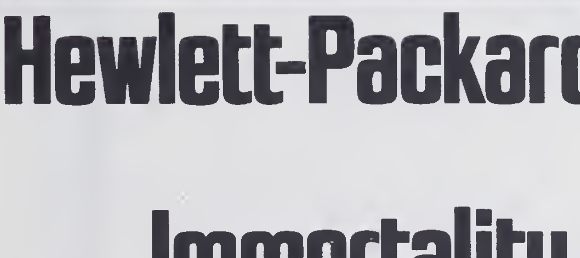
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Users Now Full Circle

(Continued from Page 29)

puter languages.

The user had now completed the circle back to his original position. He still had to contend with queuing, priorities and scheduling, but he felt more comfortable because he had regained some control.

This condition prevailed for some time until one day a curious user heard about a computer system which contained all of the features of the large computer, but on a much smaller scale.

Suddenly the user had more options than he knew how to evaluate. If he survived the past, he could do his own thing with his own computer or he could obtain a user number on a large computer or he could give the job to a vendor who hopefully would solve all of his problems or any combination of the above.

The user was now in danger of being in the same dilemma as the wife who calls the doctor because her husband is sick. The doctor arrives and prescribes pills to be taken every four hours. He returns the next day, examines the patient and says he is improving.

This process continues for five days and the doctor continues to report improvement. On the sixth day, the patient dies. When the widow is asked the cause of her husband's death, she replies, "Improvements."

Ryan is a retired DP manager.

Real Chargeout Only Illusion

(Continued from Page 28)

problem with fair pricing. To internal users, a fair price is a low one. DP shops which sell their services operate with a market price which is governed by competition. Internal DP shops would do well to move up to a market price as well.

Prices and costs are not the same thing. Costs can be approximated more exactly by more careful measurement techniques. A one-parameter cost measure may capture 80% of the user variance in the use of facilities, a two- or three-parameter measure 90% to 95%; and a 100-parameter measure won't do much better than a three-parameter measure.

After a while, the cost of accumulating and analyzing the information exceeds the amount of the variance.

The same is true on the price side. If a one-parameter model, such as $1 per transaction, is too simplistic, then a fixed charge plus a transaction cost or a two- or three-variable price may be appropriate.

A fair price is one users are willing to pay. If it is based upon understandable cost information and it is in line with general market prices, there will be no difficulty in gaining acceptance.

If a price is too high and users are unwilling to accept it, the market mechanism will ensure that the service will be replaced by a more efficient one that gives the user what he needs and wants.

A reasonable chargeout system doesn't try to price costs exactly, because costs cannot be determined exactly. Prices should be generally related to costs and should be generally replicable, based upon units the user understands.

If costs are not recovered exactly one year after the dust has settled, prices should be increased the next.

The perfect chargeouts are not only unobtainable, they are nonsensical. Who cares what an EXCP costs?

Let's settle for a reasonable charge for services and get on with the work of solving the user's problems.

Cooke is manager of systems and programming for Midatlantic National Bank, West Orange, N.J.

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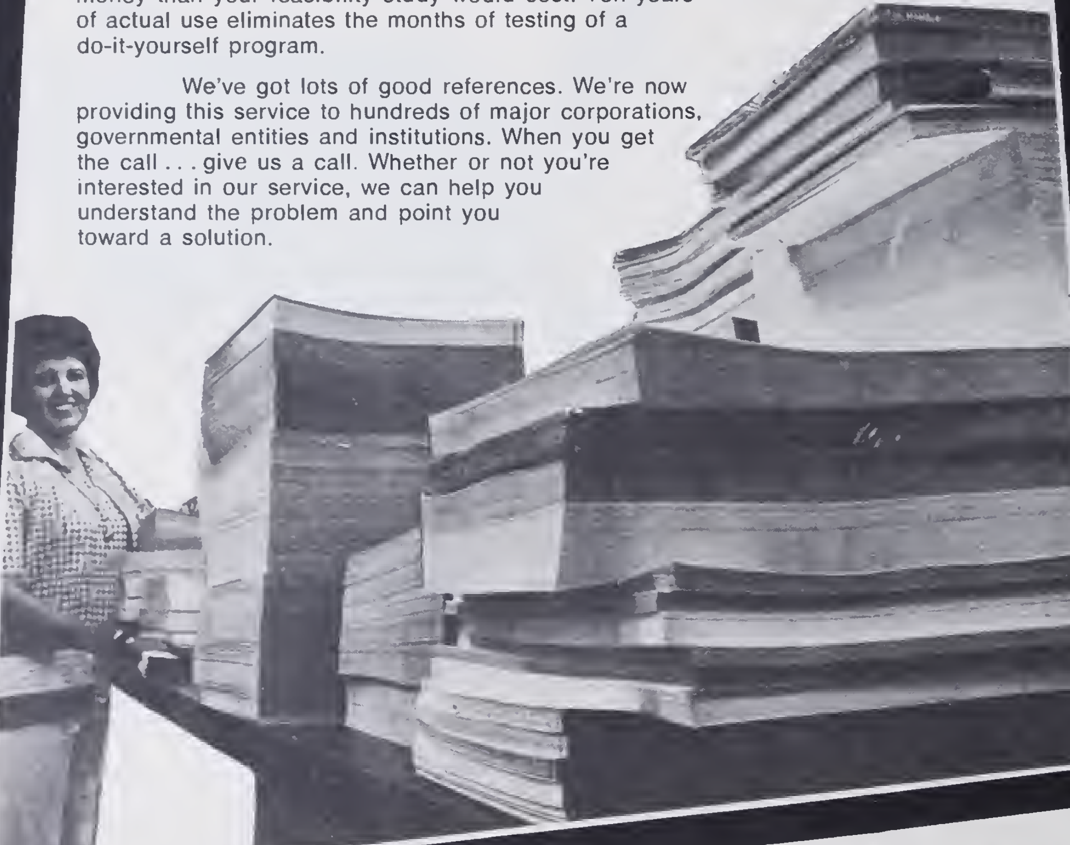

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Licensing: The Issue That Still Won't Die

By Kenniston W. Lord Jr.
Special to CW

Three years ago the name of Ken Lord was launched into national notoriety by the filing of the nation's first data processing licensing bill. Perhaps now is the time to take a retrospective and and dispassionate look at what it was, what it was intended to be, why it happened, where it's likely to go and why.

As the title given by *Computerworld* to this column would indicate, its author had gained a reputation for seeking a battle. That was absolutely true — with the emphasis on "was."

In truth, the filing of the licensing bill was the culmination of a long list of events carefully planned and calculated to launch me into the public spotlight, a process begun in 1969. Why was such a process begun?

It was the offshoot of employer pressure for me to gain credentials. I gained my Certificate in Data Processing (CDP) the same year and my college degree the following year. But like other "personal objectives" detailed over the years, their realization did not bring fulfillment.

The licensing issue was somehow different. What began in 1973 as a means to elevate Ken Lord quickly became a worthy passion, for I began to *believe* those things which I had written and spoken.

By the time the bill was finally filed in Massachusetts, I was convinced that there was a problem and that licensing was a means of addressing the problem. I am no less convinced today.

Despite the fact that I stopped speaking to the issue in 1975 (there was a strong personal, professional and economic backlash), it's somewhat rewarding to know that the discussion continues, as readers of recent issues of CW can attest.

For three years we have read and written defenses of both — if not all — sides of the question. And here we sit three years later, having accomplished little, if any, forward progress in addressing the issue — the right of the public to be protected from those of us who would work to its disadvantage.

If it were a simple issue, that would be one thing. But there are ancillary issues which make it something else entirely.

In truth, we're talking about a fabric of protection and prevention, not just a single aspect — licensing or certification. Included in such discussions are elements of privacy, consumerism, "professionalism," propriety, standards, education and, most certainly, elements of humanity.

The time is past for "war stories" of how computer people, with their patented insensitivity to humanity, have disadvantaged that humanity. No longer is it really valid to detail how the consumer has been folded, spindled and mutilated.

Those items have been well documented and commented upon. Nothing new under the sun remains to be discovered in this area. But that does not mean that such practices will not continue. Most certainly they will — until the DP community or legislative bodies take some appropriate action.

The licensing bill filed by the Society of Certified Data Processors (SCDP) upon my insistence was a device necessary to call attention to what we felt was the real issue at that time — standards.

Standards of practice, education and performance continue to escape us after more than a quarter century. Standards of ethics continue to be discussed and ignored. Standards of privacy will gradually emerge, although more despite us than because of us.

Standards for systems design will gradually emerge, but we will suffer the loss of much blood and prestige before that happens. Standards of certification may also emerge if the Institute for Certification of Computer Professionals (ICCP) can merely set aside the proprietal interests of its constituent bodies.

. . . And in This Corner

In my upcoming columns, I shall present one plan for addressing the issue in its entirety, or at least the entirety as I see it. We'll look at what has transpired in the three years since licensing became the topic of discussion. We'll look at both licensing and certification, to see if we can draw a clear distinction between them and show how, when and why they can work together.

I don't guess that old Ken is any less a combatant than before. A leopard cannot change his spots.

But what he can do is tender some positive recommendations which engender rational discussion among the thinking people of this industry, for it would seem that a three-year-old issue which refuses to die must have some merit, if only to clearly demonstrate that a critical issue remains to be resolved. Perhaps among us we can find some answers.

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Reader Commentary

Bill Creates Federal Standards Body

Passage of S. 825 Will 'Lock Up' Technology

By David C. Abbe
Special to CW

On March, 1, the *Congressional Record* reported a bill, S. 825, submitted by Sen. James Abourezk and coauthored by Senators Birch Bayh and Hubert Humphrey. The basic purpose of this bill [CW, July 11] is to create a government role in the regulation of all private, nonprofit standards committees.

The government would "offer" federal funding of such committees to "improve" the basic standardization activity by including representation on these committees of consumer groups, testing services, etc. This funding would also be used to "expand" domestic standardization efforts.

Therefore, under the direction of the Federal Trade Commission (FTC), a new department will be established within the National Bureau of Standards.

It will be called the Institute of Standards and Accreditation and will "develop the resources, facilities and expertise necessary" to "develop a uniform national standardization process."

The impact would be that any private, nonprofit organization which sponsors standards development would be subject to direct FTC regulation. The composition of the committee membership would be changed and formal appeals procedures required.

In the event any standards group failed to adhere to federal rules, the government would step in and replace it.

The bill's authors argue that this is necessary because, some past standards have violated the intent of antitrust regulations.

It is clear to me that this is creating a federal program to socialize the control of industrial technology in the private sector. The political history of the bill's authors gives further support to such a concern.

I believe that it is in the best interest of the American public and our free enterprise system, which includes many good self-regulating standardization efforts, to oppose this bill in its entirety.

If we allow the federal government to "lock up" our technology in fixed standards and standardization formats, it could have a serious impact on our industrial productivity, balance of trade and general economy.

The American involvement in international standards would also be seriously abridged, as the international standards organizations could hardly be expected to stand still for federally mandated U.S. positions.

Over the past decade, federal spending for R&D has continued to decline in favor of more spending on nonproductive programs intended to improve the "welfare" of the least productive sectors of the American public. To fill this gap, private industry has had to increase its commitment (with no particular tax incentives) to new development works in order for the U.S. to retain a leading position in world technology. This bill is a great danger to any reasonable continuation of these private efforts.

S. 825 is presently in the Antitrust and Monopoly Subcommittee of the Senate Judiciary Committee. No immediate House action is expected.

There is still time to write your senator and voice opposition to this dangerous legislation.

Abbe is product manager of Ade Corp. in San Diego.

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With Remote Processing

Service Caters to Insurance Group Needs

ATLANTA — While most remote computing services have capabilities for a broad range of users and avoid catering to the needs of any particular user group, there are exceptions. The Home State Insurance Companies of the Berkshire-Hathaway group, for example, are taking advantage of a processing service for property-casualty companies.

The five companies in the group are widely scattered across the midwestern U.S. They include Cornhusker Casualty in Kansas, Lakeland Fire and Casualty in Minnesota, Texas United, Insurance Company of Iowa, and Kansas Fire and Casualty.

The service is provided by Insurance Systems of America (ISA) from its data center here. Under the service arrangement, the group will have the use of modern equipment and software geared to its needs, without the heavy expenses of a large computer and a DP staff.

The parent corporation has been providing DP services for the companies since their inception. While these services were adequate, management felt that future growth would require more sophisticated systems.

Then, however, the group faced a dilemma that is all too familiar for small-to-medium-size companies: How could it achieve the improved efficiency, control and customer service that automation offers — without incurring the high costs of hardware, software and a qualified technical staff?

According to Larry Steen, systems manager for the group, the processing dilemma appeared to have no satisfactory solution. "One option was to do nothing — but that was contrary to our concept of providing responsive, local service at a reasonable cost. Buying our own computer and software and hiring experienced technicians was cost-prohibitive. A third alternative was to convert our parent company's systems for our needs, but this approach proved to be much more difficult than we expected."

Hookup Option

Then, early this year, Steen discovered a new option: Use a teleprocessing hookup with ISA's data center, where software could be maintained to fit the needs of the Home State Companies.

"The service approach has significant advantages," Steen said. "We don't have to buy a large computer, hunt for technical people with insurance experience or develop our own system. ISA has computer facilities, proven software and experienced people. The processing service will give us the benefits of better software than we could achieve on our own — and on a much more economical basis."

Each company will have a 48K Data General Corp. Nova 3/D minicomputer for preliminary processing of policies, claims, premiums, billings and corporate accounting data. This data will then be transmitted to ISA's 2M-byte 360/65 running with Itel software supporting 370 facilities such as Vsam.

There, two software systems will take over: "V-4," an on-line casualty processing system; and the ISA/Accounting, Budget and Cost System. Results from these two systems will be transmitted daily to the minicomputers in Omaha, Minneapolis, San Antonio, W. Des Moines and Topeka.

GIS/VS Optimizes Productivity In Various Programming Tasks

WHITE PLAINS, N.Y. — Version 1, Release 1.1 of the Generalized Information System/Virtual Storage (GIS/VS), announced recently by IBM, was designed to support a variety of information processing activities with facilities for defining and processing OS/VS data files and DL/1 data bases.

Particularly useful to programmers and analysts as a programming productivity tool, according to IBM, GIS/VS can also be used as a query facility, as a report generator or as a production reporting system.

GIS/VS V1 R1.1 is said to include three installation management exits that allow insertion of user routines for accounting and control. On a more detailed level, it provides automatic decimal alignment of numeric data in GIS/VS procedures as well as limited phrase substitution for GIS/VS procedural language statements.

This update also includes support, through IMS/VS, of the IBM 3790 communication system when in 3270 data stream compatibility mode. It will also support the 3767 communication terminal and 3770 data communication system, a spokesman said, adding that the software also supports the IBM 3800 printing subsystem.

While GIS/VS incorporates a basic query capability, an extra cost option, provides the user with a means of operating with IMS/VS. The combination of GIS/VS and the data base management system provides more power and flexibility than is available if they were used separately, the spokesman claimed.

GIS/VS is supported by OS/VS1 and by both the SVS and MVS versions of OS/VS2 or wth OS/VS1 or OS/VS2 under the Virtual Machine Facility (VM/370), as well as under IBM's Time Sharing Option (TSO), he said.

The basic GIS/VS is available for a monthly license fee of $907. The Advanced Query feature costs an additional $283/mo and two other features, Update/Create and Modify, are available for monthly license fees of $595 and $141 respectively.

IMS Users Get 'UCC-41' Aid

DALLAS — A data base space utilization program from University Computing Co., UCC-41 is designed to run on all versions of IBM's Information Management System (IMS), according to a spokesman.

The software is said to provide "a new dimension of detail" in determining effective space utilization in IMS operations. The package will aid the data base administrator in recognizing the appropriate time for data base reorganization, he said.

It also highlights the need for additional direct access extents and volumes as well as the need to change DBGEN parameters for improved use of direct-access space and processing efficiency, the spokesman noted. In addition, UCC-41 details the current status of free and occupied space with the data base.

Latest in a series of "System Aid" packages that UCC said can practically be installed by mail, UCC-41 requires no changes in IMS or additional JCL. It can be fully installed after two assemblies — the source code in Assembler — and a link edit.

UCC-41 examines physical or logical data bases of Hierarchical Direct (HDAM or Hidam) organization that are stored in either Osam or Vsam, according to the spokesman. The program can optionally analyze multiple data bases in one execution and supports secondary data set groups, he added.

The program calculates statistics on Free Space Elements, Root Anchor Points and Occupied Space, and produces reports in any of four optional levels of detail. The user's manual includes typical case problems, report analyses and recommended alternatives for improvement, he said.

The packages can be ordered for $3,200 from UCC, 8303 Elmbrook, P.O. Box 47911, Dallas, Texas 75247.

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Modular Package Aids Manufacturing Control

NEW YORK — The modular Manufacturing Systems I (MS/I) package from Synectics Data Systems Ltd. (SDS) is a total production system to help the smaller manufacturing organization control operations from an ICL 220, a Singer System Ten or a Data General minicomputer.

With the system in place, a user should have enough information to meet delivery dates, plan manufacturing purchases and minimize stock holdings, he said. The ability to minimize work in progress, measure manufacturing costs and quantify cost changes before taking action is also built into the package, according to a spokesman.

Intended for vendors with up to 20,000 parts, MS/I includes five modules. The Bill of Materials Processor provides on-line maïntenance of basic manufacturing information concerning parts, components and operations.

The Inventory Control subsystem handles on-line recording of stock movements as well as inquiries, analysis reports and stock valuations. Standard and "what if" costing, provided by a third module, includes calculation of standard and current production costs.

That module also supports on-line updating of current costs and the immediate testing of the effect of cost changes, the spokesman noted.

MS/I provides two alternative modules for material requirements planning (MRP).

A documentation module rounds out the base package. This produces trial packing lists checking stock availability.

Developed by Safe Computing in the UK, MS/I requires 40K memory and is available in this country for $24,700 or $988/mo for three years, plus installation support costs of up to $8,000.

Individual modules are available separately, except in cases of interdependency, for from $8,300 for the Bill of Material Processor to $2,700 for Documentation, the spokesman added from SDS's offices at 166 E. 34th St., New York, N.Y. 10016.

San Francisco Seminars Set Focus on Program Testing

SAN FRANCISCO — Two-day tutorials on the concepts and techniques underlying effective testing of computer programs will be presented here in San Francisco every other month during 1978. The sessions were designed to help both management and technical personnel, according to Dr. Edward F. Miller Jr., who will serve as instructor.

Presented by Software Research Associates, the seminars will be held in mid-January, early March, mid-May, July, September and November. In addition to San Francisco, the tutorial will probably be given in other cities in the U.S. and abroad, Miller noted.

Five major subjects will be covered in the sessions. A segment on the philosophy of testing — including motivating forces, testing principles, an overview of methodology and preparation, will be followed by a discussion of the theoretical foundations, which provides general principles, graph theory, program behavior modeling and combinatorics.

The third area, tools and techniques, also starts with general principles, then considers static testing, dynamic testing, systematic methodologies and test data generation. Along with its general principles, planning and measurement, the next segment focuses on test structuring, according to Miller.

The wind-up topic — Management and Control — details the economics of testing and test status monitoring, he said.

That is a tremendous burden, he admitted. On the other hand, failure to test or inadequate and incomplete testing can have an adverse effect on the quality of a delivered software sytsem, he pointed out.

The program testing tutorial registration fee is $395, which covers attendance and a detailed notebook including a bibliography, a topical cross-reference, technical summaries of papers and other related documents.

More information is available from Software Research Associates, P.O. Box 2432, San Francisco, Calif. 94126.

Cassette Course For Supervisors

FLUSHING, N.Y. — The Supervisor Development Program, an audio-cassette based training course from Meadows Communications, consists of four major units: the role of the supervisor, communications, human relations and leadership techniques.

Topics discussed in the course include the nature of supervision, the role of the team, setting realistic objectives, the importance of listening, elements of Transactional Analysis and "selling your ideas up and down the organization."

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CHICAGO — Zimmerman Brush has a broad product line, a national distribution network — and a computer system that helps gear production and inventories to current market demand.

"With computer control, we have managed to slash average inventory cost by 30% while stepping up the rate of inventory turnover," according to Mike Zimmerman, the firm's president. "At the same time, we have improved customer service to the point where over 85% of incoming orders are turned around the same day or the next morning."

The Xerox Computer Services Interactive Accounting System (IAS) used by Zimmerman Brush handles many details of the financial side of the business. It prices the sales order, creates the customer invoices, updates the receivables and payables, produces the payroll, posts to the general ledger, and pinpoints cost and profit performance all along the line.

However, its role goes well beyond conventional accounting functions into almost every facet of day-to-day operations, from planning materials requirements to controlling production schedules, according to Zimmerman.

A major contribution of the system, he said, is maintaining the delicate and important balance between raw materials and finished goods inventories, on the one hand, and customer service level on the other.

Company officials claim TAS has become inseparable from the service function. It gets into the act from the beginning, with the arrival of distributor and jobber orders which come in by mail and phone at an average rate of 250 a day. Line item totals called for by the daily incoming order flow often reach into the thousands.

Prior to installing the Xerox system, Zimmerman personnel would hand-carry the daily sales orders to a local batch-processing service bureau, where they were keypunched and printed overnight. If a rush order was required, the Zimmerman staff would either wait while the order was processed or make a return trip later to pick it up. Now, orders are entered on-line via an interactive terminal. According to Dave Worley, Zimmerman's director of systems, "If the order is in here by 11:00 a.m., we'll have it picked, packed and on its way that afternoon, assuring the customer of the fastest possible delivery. And the order invoice will go out that evening, assuring us of a faster cash flow."

Another aspect of the system involves material requirements planning (MRP). As it commits finished goods inventory to fill incoming customer orders, the system continually compares remaining stock balances against preset minimum levels. These are established item-by-item based on a forecast of demand that is updated every four weeks. Whenever a finished product item falls below its minimum level, the computer triggers a suggested production order to initiate stock replenishment to the desired level.

"What we have now is a closely monitored, continually adjusted material requirements planning cycle," Zimmerman said.

"We have been giving customers the brush for years, in a way that has kept them happy and kept us growing. With the computer at our fingertips, supporting routine operations and responding to the exception situations, there is no reason we cannot continue to keep customers happy and keep the company growing profitably," he concluded.

'Qwick Qwery' Eases Access

ARLINGTON, Va. — A simplified means of getting information from demographic, economic or corporate data bases without programming has been introduced by CACI, Inc. This generalized report writing system, called Qwick Qwery, is available exclusively on General Electrics Mark III remote computing service.

The system is said to be unique in its ability to access several public and proprietary data bases that CACI maintains and that previously were usable only after programming. But Qwick Qwery can also be used to work with corporate records such as personnel, financial or inventory files, a spokesman noted.

To retrieve information and format reports from their terminals, Qwick Qwery users define categories of information in a data "dictionary," according to their own specifications.

Further information on the use of Qwick Qwery or the CACI data bases is available from CACI, Ft. Myer Drive, Arlington, Va.

4C Compiler Adapts Code

LOMITA, Calif. — A CMS/2 compiler that allows the U.S. Navy specialized programming language to run on Rolm Corp. minicomputers and on the Data General Corp. Nova has been introduced by Command Control and Communications Corp. (4C).

Written in ANS Fortran, the compiler allows companies developing programs for Navy Univac AN/UYK-20 systems to use Rolm, Nova or IBM 360/370 CPUs as host machines. The mini-oriented compiler is available for $50,000 or $500/mo, 4C said from 1823 W. Lomita Blvd., Lomita, Calif. 90717.

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'Speedy' Reblocks Disk, Tape, Cuts DOS/VS Throughput Time

NEW YORK – Speedy is a DOS/VS enhancement package that cuts system throughput time by reblocking disk and tape files, according to its vendor, Datachron Corp.

Speedy increases block sizes for tape files to 6K, 8K, 12K or 16K bytes. It provides full- or half-track blocking for sequential disk files, Datachron said.

The effect is to take advantage of larger partition sizes in DOS/VS systems, a spokesman noted.

Reblocking takes place during normal processing runs and requires no program changes or file modifications, he said. Speedy's work reduces the number of I/O operations and, for disk files, the disk arm movement that Datachron said can be the most serious bottleneck in DOS/VS multiprogramming.

The end result is typically a 20% to 40% improvement in processing time and a 50% to 75% reduction in system overhead, Datachron claimed.

Speedy can be installed in any DOS/VS environment. It can be used for all jobs in all partitions or restricted to selected partitions, jobs and files.

The package is available under license for $3,150 or $225/mo, Datachron said from 174 Fifth Ave., New York, N.Y. 10010.

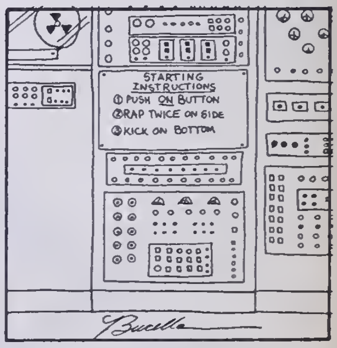
'Page' Provides Cursor Control For PDP Editing

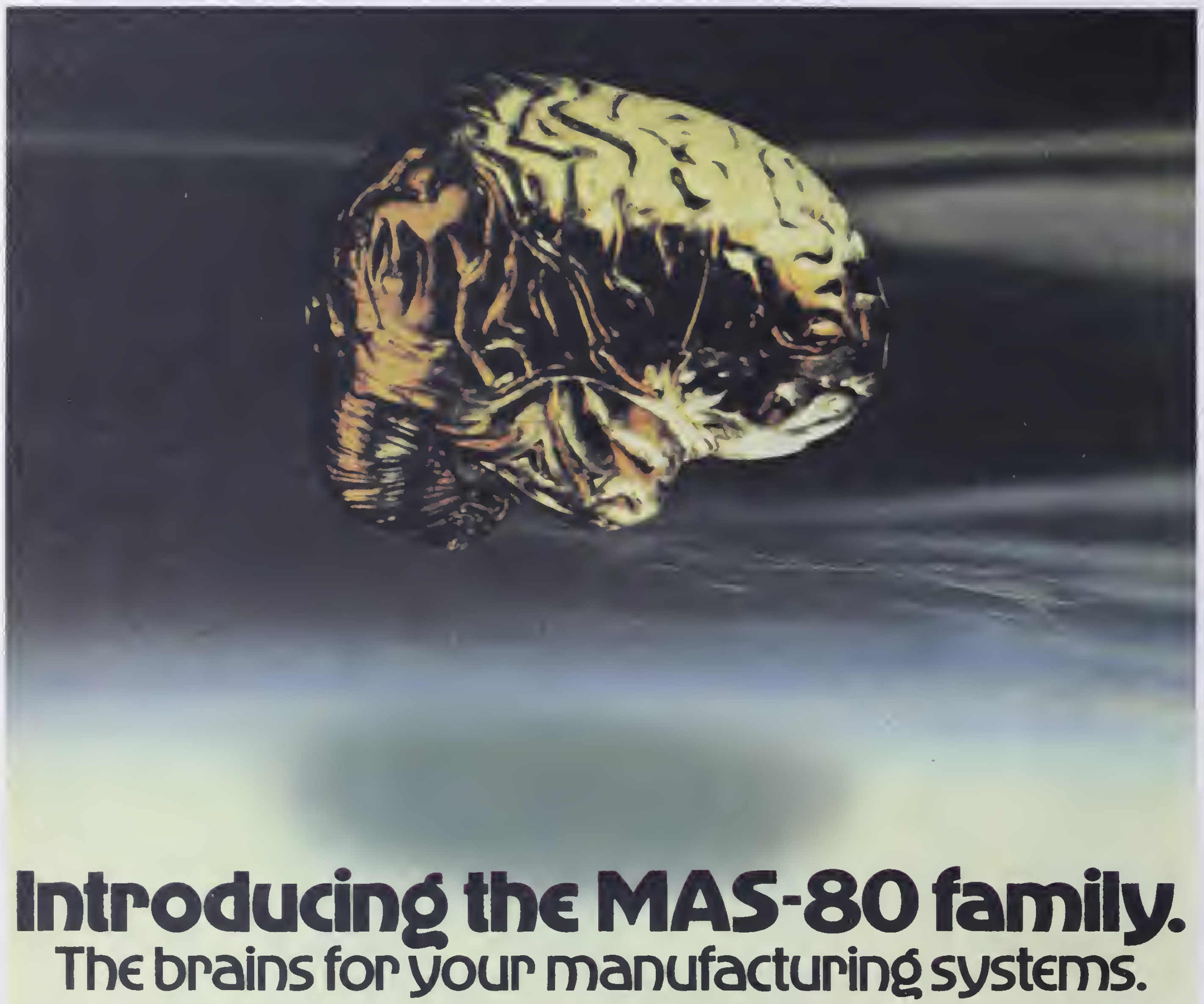
CINCINNATI – The Page package from Interactive Information Systems, Inc. (IIS) was designed to provide the user with the convenience of cursor control during full-screen CRT terminal-based text-editing operations on Digital Equipment Corp. PDP-11s.

Page displays text in context on the screen. Therefore, instead of entering "blind" commands to search, position and modify text, the user can locate text visually, then position the cursor under the character or line before entering the change, IIS said.

Page runs under RSTS/E on PDP-11/34 through -11/70 equipment. It can be implemented on any terminal with direct cursor addressing, some means to move the cursor and "delete line" and "clear line" functions, a spokesman said.

Page can be acquired for $750 from IIS at 10 Knollcrest Drive, Cincinnati, Ohio, 45237.





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People Usage Contingent on Corporate Planning

CHICAGO — Unless the issues of tight schedules, retaining good employees, and corporate objectives are addressed, any planning for the DP human resource is not likely to work, according to Nate Newkirk, president of NGP Associates of Mt. Kisko, N.Y.

In remarks prepared for delivery at the recent Professional Training Conference here, sponsored by Advanced Systems, Inc., Newkirk said it is pointless to plan for the use of any DP resource unless the planners have a grasp of organizational objectives.

Obvious though that may sound, "it is rare to find a DP plan which has a logical connection with a company's stated objectives," he said.

But this is not the only area where DP people planning often fails. Newkirk said it must also be designed to override tight schedules, which are inevitable in most DP departments.

"Give a typical project manager a tight deadline and all planning is dropped. The tighter the schedule, the more time, proportionately, you should spend in planning," he said.

On a different but related subject, Newkirk said personnel turnover statistics should be of "more than superficial" interest to management, although turnover averages that lump all personnel in a shop into one number should be ignored. Concern has to be far more specific than that, he warned.

Newkirk classified people both by their individual performance — good and bad — and by how they liked their jobs — satisfied and dissatisfied. The object, he said, is to retain the good performers, those people that offer the greatest potential. Since satisfied good performers are likely to continue anyway, he advised that "you put your money into good dissatisfied performers."

"You never have enough money and time to adequately train everyone," Newkirk said. "The name of the game is to extend the average seniority of your supervisor performers."

RDC Sets User Seminars

STAMFORD, Conn. — A one-day seminar entitled "Criteria for Choosing an Interactive Financial Planning System" will provide users and potential users with the tools necessary to select the right system for their particular needs, according to the sponsor, Real Decisions Corp. (RDC).

The seminar is scheduled to be given in New York on Nov. 14, in Chicago on Nov. 16 and in San Francisco on Nov. 18.

A unique feature of the seminar will be the development of the RDC financial decisions grid. With a specially designed workbook, each participant will plot his needs vertically and match them against vendors and system in a horizontal spread, an RDC spokesman explained.

Leaders of the seminar, principals of RDC, have spent the last two years in consulting assignments related to financial planning. In April, they published *A Comparative Analysis of Financial Reporting and Modeling Systems*, which is now being updated.

Hillel Segal, president of the Association of Time-Sharing Users (Atsu), will be the luncheon speaker in each city, discussing the role of Atsu in the remote computing industry.

Cost of the seminar is $185 for the first registrant from each company, with discounts available for others from the same firm, RDC said from 870 High Ridge Road, Stamford, Conn. 06905.

Net Updates DBMS

PITTSBURGH, Pa. — An improved version of Oliver, an interactive, generalized data base management system (DBMS), is now available on the remote computing network of On-Line Systems, Inc.

The enhancements make Oliver more efficient and flexible, the vendor said from 115 Evergreen Heights Drive, Pittsburgh, Pa. 15229.

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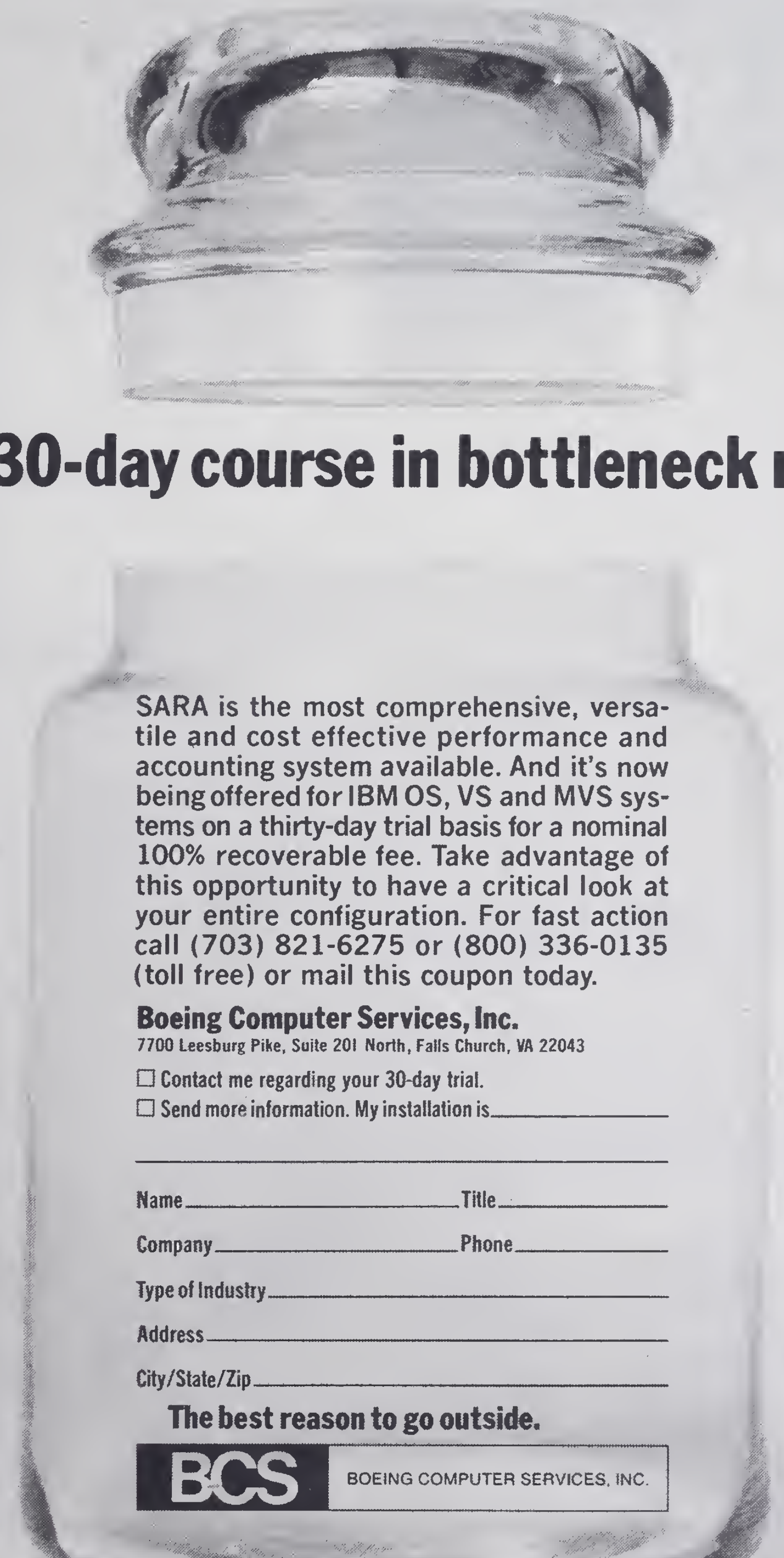

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High-Level Language for PDP-8 Allows OS/8 Basic Compilations

OAK PARK, Ill. — A high-level, business-oriented language for the Digital Equipment Corp. PDP-8 series of minicomputers, Hibol from Dewar Information Systems Corp. will generally accept Basic language syntax so that existing OS/8 Basic programs can be compiled, the vendor said.

The extended math functions of Basic are not present, a spokesman noted. Instead, Hibol provides bilevel random access as well as sequential file handling, full OS/8 directory support and background spooling, he said.

To ease the use of the language in commercial environments, decimal arithmetic and upper/lower case character string manipulation are provided. Hibol also includes functions to convert dates to Julian Day numbers and vice versa, the spokesman added.

The language allows variable-length symbolic labels and variable names and introduces several language extensions such as IF ... THEN ... ELSE statement blocks and an array search statement.

Symbolic debugging facilities in the runtime system permit the programmer to trace program execution, set breakpoints and examine or modify variables as the program is running, the spokesman noted.

Hibol requires a PDP-8 with 16K of memory running under OS/8. The compiler is available for a one-time license fee of $495 from Dewar at 221 W. Lake St., Oak Park, Ill. 60302.

SBC Service Offers MVS

GREENWICH, Conn. — The Service Bureau Co. (SBC) has upgraded the operating system of its Call/Plus remote computing service from IBM's OS/MVT to OS/VS2 Release 3.7, the multiple virtual storage (MVS) environment.

The change will enable SBC to provide users with various application products and services which, because of their VS orientation, have been unavailable under Call/Plus until now, a spokesman explained.

IBM's Job Entry System 2 (JES2), built to function in the VS environment, has replaced SBC's previous Hasp subsystem, providing users with increased function and performance, he said.

The remote computing vendor has also enhanced the support it provides for Time Sharing Option (TSO) operations, the spokesman noted from 500 W. Putnam Ave., Greenwich, Conn. 06830.

Utility Provides Data for DOS

CALGARY, Alta. — DMCVtoc from DMC Information Systems, Ltd. is a utility program designed to produce meaningful volume table of contents (Vtoc) information in a DOS or DOS/VS environment, according to a spokesman.

The program produces a graphic display of all specified cylinders showing both track utilization and data set names. Additionally, the program produces two reports, one in data set name sequence and the other in physical track sequence.

DMCVtoc is said to be compatible with all physical disk drives and file organization techniques available to the DOS or DOS/VS user community.

The software sells for $395. The company can be reached through Box 9234, Bow Valley Square II, 205 Fifth Ave. S.W., Calgary, Alta. T2P 2W4, Canada.

Inforex Release Gives 1330 Features to 1303

BURLINGTON, Mass. — Inforex, Inc. has a software package designed to bring users of Model 1303 key-to-disk data entry systems many of the features of the more powerful Model 1330 intelligent key-entry system introduced earlier this year.

The package, designated Release 309E, combines extended editing capabilities, several new library facilities and comunications and remote job entry support, according to a spokesman.

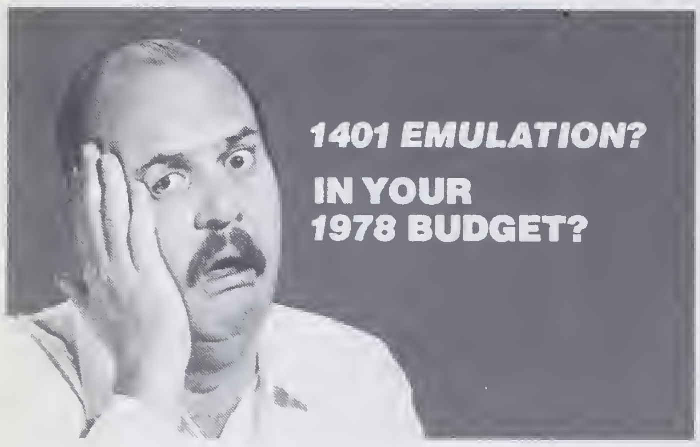
Release 309E supports single keystroke commands that enable operators to insert/delete characters, to return to any location within a record batch after paging backward through multiple records, to return to the first keyable position within a record and to repeat keystrokes with a single key depression, Inforex said.

Model 1303 users can create collated index sequential files for rapid table lookups and validation. Tables can be structured to define a wide range of valid entries and the tables can be organized alphabetically or numerically to speed operations, the spokesman said.

Supports BSC

The package also supports Binary Synchronous Communications (BSC) at speeds up to 9,600 bit/sec going to mainframes, other BSC-oriented terminals or output devices.

Release 309E is currently being distributed free to all Model 1303 users, Inforex said from 21 North Ave., Burlington, Mass. 01803.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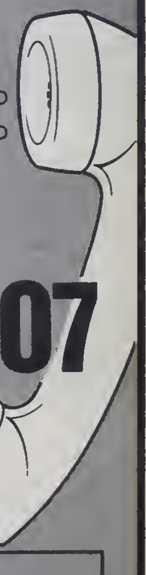

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User Gains Packet Compatibility

Independent Front Ends Upgrade Net

ARLINGTON, Va., — To accommodate additional communications lines, increase customer access to its computers and add packet network compatibility, American Management Systems (AMS) has replaced IBM 270X-type terminal controllers with two programmable communications processors from an independent vendor. Both processors were put on-line without interrupting customer service, according to the user.

The processors will enable a variety of independent computers owned by the service company's clients to communicate with the firm's IBM mainframes. Code conversions will be handled in the processors rather than burdening the mainframes with the conversion task.

The Memorex Corp. 1380 communications processors will also permit the AMS network to utilize standard packet protocol and, eventually, IBM's Synchronous Data Link Control (SDLC). Software resident in th 1380, rather than redundant hard-wired multiplexers, will handle the standard packet communications.

The processors feature flexible disk storage of the communications programs and consequently relieve the mainframes of communications overhead required by other types of communications controllers, a Memorex spokesman noted.

In addition, the 1380 communications processors have the ability to perform system tests, checkout and downline diagnostics on the network as well as on the processors themselves, he said.

AMS provides access to its mainframes for development of software before it is entered and run on client's computers. The AMS CPU's are an IBM 360/65 and an IBM 370/165 with IBM's Dynamic Address Translation (DAT) feature.

Outgrowing its original data communications handling capabilities led AMS to install the 1380 processors. According to Tom Martin, vice-president of the computer services division, "As we reached the line saturation point of our original terminal control unit, we wanted to add a communications processor with the channel capacity to reach both computers, handle more lines and perform a considerable variety of diagnostics and tests of the whole system."

The AMS system supports three principal functions.The first is a 65-line network for Wilbur, a software development text editor, that uses asynchronous communications from widely differing terminals at client locations. The second is the Customer Information Control Syteem, (CICS) an IBM transaction-based system employing polled 3270 terminals, and the third is a Hasp/RJE remote job entry system with 48 binary synchronous lines ranging from 2,000 bit/sec to wideband 19.2 kbit/sec circuits.

Unusual Installation

The installation of the first 1380 at AMS was unusual in requiring that customer service be uninterrupted. To meet this need, a few lines at a time, beginning with asynchronous lines, were moved from the older controller to the programmable 1380.

The last lines transferred were those for remote job entry. The switch took about two months, and that time was used to train AMS people to handle software development for the new processor.

"Hardware and software support have been excellent," Martin said. "The hardware has been 100% reliable, and Memorex gave us the support we needed to handle the complicated software task of Hasp-to-Hasp computer communications for the remote

(Continued on Page 42)

Micro-Based Controller Links TRW Terminals, Various CPUs

By Ronald A. Frank
CW Staff

HAWTHORNE, Calif. — A microprocessor-based communications controller has been introduced by TRW to interface the firm's transaction terminals with various host CPUs.

Called the Micro CI, the interface handles up to 16 TRW terminals in a subsystem that normally operates as part of a private-line multidrop network, according to a spokesman.

The Micro CI marks a move by TRW to make its retail, financial and other transaction terminals compatible with non-TRW processors. Previously the TRW terminals operated only with the firm's CPUs as part of turnkey systems such as the System 4000, the spokesman noted.

The controller has built-in modem supplied by Vadic Corp. and operates in most applications at 1,200 bit/sec. It also has the capability to operate at 300-, 600- and 1,800 bit/sec on four-wire full-duplex circuits, TRW said.

The Micro CI uses a Motorola M6800 microprocessing unit and can operate with TRW terminals including the 4103 and 4110 credit terminals and the TT 115 and TT 154 funds transfer terminals. It can also handle Ascii-type glass teletypewriters such as those supplied by Lear-Siegler and Conrac, the spokesman said.

The controller is compatible with several protocols including the TRW Comcode, described as a four-bit hexadecimal character code that interfaces with Ascii networks. Other supported protocols are those used by the IBM 2848, Burroughs TC 500 and TRW FSD terminals.

The Micro CI can interface with host CPUs that include the IBM 360 and 370, NCR 723 and Burroughs B5000, TRW said.

Applications for the controller include retail environments such as specialty stores, car rental agencies, airline ticket counters and hotels. Financial applications and other data entry applications including inventory control are also suitable for the controller-based terminal subsystem, TRW said.

The controller is modular in design and allows the user to perform diagnostics such as analog loopback and cyclic redundancy tests.

A typical terminal subsystem costs "between $1,000 and $2,000 per controller and about $400 per terminal depending on customer requirements," the spokesman said from TRW Data Systems at 12911 Simms Ave., Hawthorne, Calif. 90250.

TDM Handles Two Channels

ROCKVILLE, Md. — Syntech Corp. has introduced a two-channel time-division multiplexer (TDM) that reportedly allows simultaneous transmission of two channels of asynchronous data over a single synchronous data communication line.

Suitable for applications in which two or more asynchronous data channels must be transmitted over a common distance of 50 miles or more, the TDM-2 can be used in private-line terminal-to-terminal or computer-to-terminal applications, the company said.

The product also suits point-to-point or multipoint networks and allows each channel to operate independently in full-duplex,·half-duplex or simplex mode.

At $995, the TDM-2 comes with an EIA cable and two EIA receptacles.

Syntech is at 11810 Parklawn Drive, Rockville, Md. 20852.

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First in U.S.

Telenet Implements X.25 Interface Service

WASHINGTON, D.C. — Telenet Communications Corp. has introduced a synchronous data communications service for computers and other programmable devices equipped with a standard X.25 interface. The firm said service is the first in the U.S.

Following completion of successful test operations at initial customer sites, X.25 support is being made available in Boston, Chicago, Dallas, Los Angeles, New York, San Francisco and Washington, D.C.

Expansion to additional cities is proceeding; by the first quarter of 1978, X.25 support will have been extended to a total of 22 cities, according to Telenet.

The X.25 interface has been approved for worldwide adoption in packet networks by the Consultative Committee on International Telephone and Telegraph (CCITT). A number of equipment manufacturers and software firms have indicated their intent to provide X.25 interfaces for their product lines, Telenet noted.

Raytheon Data Systems provides an interface for its IBM 3270-compatible Raypac terminals. X.25 availability has also been announced by IBM World Trade in Canada and France.

The X.25 protocol adds capabilities for users of Telenet's public packet network and other compatible packet networks. The interface permits a customer computer to handle up to 4,095 logical connections simultaneously over a single network access line, Telenet said.

Each connection is switchable on demand and individually flow-controlled, permitting devices of dissimilar speeds to communicate with each other without loss of data or congestion, a spokesman added.

In addition to Telenet in the U.S., X.25 service is being planned for implementation in public packet networks in the UK, France, Japan and in the Common Market Euronet network. It has already been implemented in the Trans-Canada Telephone System's Datapac network.

The X.25 interface is available without additional charge to Telenet customers. Telenet Communications Corp. is at 1050 17th St., N.W., Washington, D.C. 20036.

Front Ends Add Packet Feature

(Continued from Page 41)

job entry system."

The 1380 can operate as a front-end processor for up to four 360 or 370 CPUs and each can control up to 216 communications lines. Unlike older hard-wired units, the 1380 has a control console for system checkout testing and downline diagnostics; the unit detects line errors anywhere in the system. Disk drives store the communications software for the processors without involving the mainframes, Memorex said.

AMS selected options with its 1380s to handle medium-speed, high-speed and wideband communications lines. The company uses two channel adapters per communications processor to connect both processors with both computers.

Plans for X.25

Plans are being implemented to add the Memorex X.25 program for standard packet transmission between the CPUs and IBM's Network Control Program (NCP) software for SDLC. The communications processors will then handle demultiplexing for standard packets in the software.

The packet network protocol system, recently adopted as a CCITT standard, will offer the advantage of tying the AMS system into other systems using standard packets. Software demultiplexing eliminates redundant hardware in the multiplexer; the 1380 can handle processing for this type of transmission, while 270X-type equipment cannot.

The capabilities of the 1380 made it possible to connect a second control console to the communications processor during the installation of the first unit at AMS, Martin noted.

Currently, in-house use consumes about 5% of AMS data processing, with the remaining 65% being done for outside clients.

In the future, software will be included in the 1380s to handle communications with Digital Equipment corp. PDP-11 processors at remote client sites, with the 1380 handling the code conversion for communications with the IBM mainframes.

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Trivex Local Controller Works With IBM 3272

COSTA MESA, Calif. — Trivex, Inc. has announced the Model 0722 local controller, which it described as 100% compatible with IBM's 3272 unit.

The controller features "total cluster diagnostics." IBM or Trivex CRTs and printers can be attached in any combination, Trivex said.

Ignores Bad Units

The Model 0722 is microprocessor controlled and programmed to ignore nonoperational cluster devices, a spokesman added. This assures that a bad device will not tie up the computer channel or communications line, making the total cluster and potentially all channel devices inoperational, he explained.

Trivex also announced two enhancements for its Model 0772 CRT, which is compatible with the IBM 3277. The enhancements are a 10-key numeric pad and a 25th line on the display.

The controller is available on lease plan or purchase. The purchase price is $5,390, while lease rates range from $140/mo on a four-year term to $170/mo on a two-year term.

Trivex is at 3180 Red Hill Ave., Costa Mesa, Calif. 92626.

Micom Unwraps Processor Built Around Z80 Micro

CHATSWORTH, Calif. — Micom Systems Corp. has introduced the 20 Series communications processor, a self-contained communications oriented microcomputer system built around the Zilog, Inc. Z80 microprocessor unit (MPU).

The processor was designed to facilitate the implementation of custom communications controllers, according to the firm.

The Series 20 is suited for use with concentrators or contention units with four or eight channels and single-channel converter systems between different communications protocols.

A processor configuration consists of the Z80 MPU, up to 19K bytes of random-access memory (RAM) buffer storage and up to 8K bytes of programmable read-only memory (Prom) control firmware.

It also incudes up to nine synchronous and asynchronous communications interfaces and an operator's console.

The central control module incudes an LED display and 10-position function switch, both under program control, to permit diagnostic test and system monitoring.

A Micom Series 20 configuration starts at $880 for a two-channel unit, according to the firm at 9551 Irondale Ave., Chatsworth, Calif. 91311.

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Seaton Unveils 'Dumb Recorder'

CARROLLTON, Texas — Seaton Corp. has introduced "The Dumb Recorder," said to be a low-cost removable storage device designed to satisfy users' storage needs for communications terminals and controllers.

The SC-1000 is a stand-alone Philips-type cassette recorder with an RS-232 interface. It records and plays back any serial code, operates at speeds from 50- to 1,200 bit/sec and has a 100,000 character data capacity, according to the firm.

Recording on the SC-1000 is incremental by character or by block, a spokesman noted.

Applications for the recorder include use as a high-speed loader for microcomputers, minicomputers, programmable controllers and intelligent terminals; as a paper tape replacement; or in data collection situations.

The basic version costs $795, according to the spokesman for Seaton, which can be reached at P.O. Box 193, 1905 Kirkwood, Carrollton, Texas 75006.

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Omron Terminals Provide for Customization

SUNNYVALE, Calif. — A computer terminal system that allows business users to obtain tailored terminal systems at a claimed 40% to 50% hardware savings has been introduced by the Information Products Division of Omron Electronics, Inc.

Designed to provide an alternative to the high cost of purchasing multiple custom terminals with identical programs, Omron employes its 8035 programmable terminal as a developmental unit to generate finalized application programs for use in 8038 terminals.

The 8035 is a CRT terminal with keyboard entry, peripheral dual floppy disk storage and a developmental software package for the creation of microprocessor programs.

The 8038 is similar to the 8035 with the same physical, mechanical and display characteristics, but without the developmental application package, the company said.

The 8035/38 combination was designed for stand-alone applications where multiple terminals run the same program and program changes are infrequent. "The traditional approach has been to use expensive customized terminals at all locations," a spokesman said.

The 8035 user designs a program that allows an 8038 to suit the needs of a specific application. After debugging, the 8035 program is then transferred onto a floppy disk storage memory.

This disk is then returned to the vendor, where the program is loaded into programmable read-only memories (Prom), creating permanent copies of the original program. These Proms can then be installed in any number of 8038s, making each capable of performing that specific program, the firm said.

"The 8035/38 combination has two primary types of applications," the spokesman said. "For a business or institution where a more expensive system of tailored terminals is anticipated, our 8035/38 combination can accomplish the same operational results for much lower cost.

"For example, a 20-terminal system of intelligent devices might cost approximately $150,000, while a comparable system of one 8035 at $7,500 and 19 basic 8038s at $2,750 apiece would cost $59,750."

Prices will vary with the exact features specified, such as extra pages of storage or printer option, he added.

Omron Electronics is at 432 Toyama Drive, Sunnyvale, Calif. 94086.

Doll, Elfenbein To Give Course In N.Y., London

MONTCLAIR, N.J. — Technology Insight Foundation has scheduled two repeat sessions of its three-day course on international telecommunications. The session will be held Nov.14-16 at the New York Hilton and Dec.12-14 at the World Trade Center in London.

The fee for the course is $575 and includes all sessions, lunches, a reception, a two-volume text and substantial technical material distributed for various PTT and common carrier services.

Lecturers for the course will be Leonard Elfenbein and Dixon Doll. Elfenbein is president of Telecom Systems Group, Inc. here and Doll is president of DMW Telecommunications Corp. in Ann Arbor, Mich.

The course is held in cooperation with the World Telecommunications Directory (WTD), and much of the services, tariff, and technical information included in the course is provided by the WTD, according to the spokesman.

Further information is available from Technology Insight Foundation, P.O. Box Y, Montclair, N.J. 07042.

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Our quantity-50 OEM price for the *Silent 700** Model 743 KSR Terminal is now just $1088†. In larger quantities, the price goes below $1000.

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TI's Model 743 KSR

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Incoterm Controller Links Small Clusters With CPUs

WELLESLEY HILLS, Mass. — Incoterm Corp. has announced a small cluster controller, the SPD 15/25, for installations requiring one to four CRT operator stations.

The SPD 15/25 terminal processing unit (TPU) is a programmable controller for the attachment of CRT terminal clusters and for on-line communication to a CPU. It is said to operate with the communications protocol of a variety of mainframe computers.

The units can provide support for up to two 1,920-char. displays or up to four 960-char. CRTs, as well as for a full line of printers, Incoterm said. The TPUs can be multiplexed to share a common modem and to offer increased display positions should the application require, a spokesman added.

The SPD 15/25 contains a fully programmable interrupt system, an arithmetic/logical processor and a real-time clock. The TPU also contains a refresh subsystem with 4K bytes of directly addressable random-access memory (RAM) for screen data, the company said.

The SPD 15/25 memory can be configured from RAM, erasable programmable read-only memory (Eprom) or core. Up to 64K bytes of addressable memory are allowed, according to Incoterm.

The SPD 15/25 has a built-in communications controller operating in full- or half-duplex mode, with synchronous or asynchronous protocols at speeds ranging from 75- to 9,600 bit/-sec. All standard communications line codes are supported, including Ascii, Ebcdic and Baudot, Incoterm claimed.

In addition, the SPD 15/25 provides 15 levels of priority interrupts and interfaces capable of controlling a wide variety of peripheral devices, the firm said.

The SPD 15/25 is offered in three configurations.The primary system permits users to program applications utilizing Incoterm-provided Assembly language and executive routines. Prices for the standard system range from $5,570 for single-station configurations to $7,235 for dual configurations.

The airline Pars configuration, ranging from one to four stations, is priced from $4,680 to $8,370. Quantity discounts are available for both the primary SPD 15/25 and the Pars configurations.

Standard emulator software packages for the SPD 15/25, including IBM 3270, Honeywell VIP 7700, Univac U-100 and Burroughs TD 820, are available. Purchase prices for emulator configurations range from $4,400 for single stations to $5,633 for dual configurations.

First customer shipments will begin in December, Incoterm said from 65 Walnut St., Wellesley Hills, Mass. 02181.

Patches Ease Circuit Changes

MOORESTOWN, N.J. — Spectron Corp. has introduced a series of telephone line patches that facilitate the rearrangement of telephone circuits and related equipment to meet data communications system requirements.

The Model TLP-416 provides a patch field for 16 four-wire lines or 32 two-wire lines. Spectron's Model TLP-408 can accommodate eight four-wire or 16 two-wire telephone circuit appearances.

The patches are modular in design, enabling units to be added as requirements demand, according to a spokesman.

With the units; users can patch any telephone line to any modem and monitor the line without disturbing network operation, he explained.

Test equipment may be permanently connected to a spare position to facilitate measurements of line or modem parameters, and data access arrangement (DAA) units may also be wired to spare positions

The TLP-416 and TLP-408 were designed to be mounted in a standard 19-in. rack. The telephone line and modems are linked by connectors mounted at the rear of the unit; an identification marker strip is provided for circuit identification.

The TLP-408 costs $390; the TLP-416 is priced at $580, Spectron said from 344 New Albany Road, Moorestown, N.J. 08057.

Multi-Use Modems Gain Remote Testing

FT. WASHINGTON, Pa. — Tele-Dynamics has added a capability to its Model 7208 4,800 bit/sec modem to permit remote diagnostic testing in either point-to-point or multipoint networks.

Selection of the remote modem to be tested and control of the test mode desired are made from a single central site without operator attendance at the remote sites,the company said.

The remote diagnostic capability is available as an optional feature or can be added to 7208s already operating in the field by plugging in a standard PC card in each modem. No other equipment modification is required, according to the vendor.

With the capability, the point-to-point Model 7208A costs $2,750 and the multipoint Model 7208B costs $3,100. Tele-Dynamics is at 525 Virginia Drive, Fort Washington, Pa. 19034.

Portable Units Lower Jet Fuel Use

ONTARIO, Calif. — Multimillion-dollar corporate jet and turboprop aircraft are being helped to reduce costly fuel consumption by computerized flight scheduling and planning that utilizes portable data terminals.

A computer-based flight planning services used by corporate pilots, as well as airlines and the U.S.Navy, is Jetplan from Lockheed Aircraft Service Co. Jetplan provides, via Computer Devices, Inc. (CDI) portable Miniterm units and an IBM time-sharing CPU, the information required by pilots so maximum travel with the lowest fuel consumption is possible.

Corporate pilots have access to worldwide weather reporting, route analyses and complete performance data for more than 50 jets and turboprop aircraft.

"Corporate jets are considered important business tools and fuel savings mean real dollars saved, as well as reduction of energy consumption. This is a real, attainable goal sought by most major corporations," according to Lou Reinkens, manager of aviation services for Lockheed.

That's where Jetplan comes in. Instead of two or more hours of calculations, the corporate pilot plugs his portable Miniterm terminal into a wall outlet and inserts a telephone into the built-in acoustic coupler. He dials the computer and types in his aircraft, desired route and payload. Within seconds, the pilot gets back a complete flight plan.

Although the Jetplan service is available to users via Telex and TWX, more than 100 subscribers use CDI Miniterm 1203s available directly from Lockheed.

"Pilots use Miniterms directly from airports — even using pay phones — or in their hotel rooms. Because they can talk to the CPU and get complete flight plans in only seconds, they can wait until just before boarding time to optimize their fuel loads" with the terminals, Reinkens said.

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CPC Family Has Same Software, Different Keys

BRIDGEPORT, Conn. — Computer Peripheral Corp. (CPC) has introduced a family of microprocessor-based CRT terminals that permit upward and downward integration.

Designated the Cops 15, 20 and 30 series, the terminals allow users to interchange terminals without changing software, a spokesman said.

The terminals also offer customers features like reverse video by character and by field and buffered keyboard transmissions, he added.

Terminal Transactions

They are also software-compatible with Digital Equipment Corp. VT52s and three Lear Siegler, Inc., terminals — the 80M1, 80M1A and 80M2A.

The terminals are rated at 60W, nominal, and come in 63-, 80- and 104-key keyboard configurations.

The 63-key Cops 15 costs $1,125; the 80-key Cops 20 is priced at $1,175; and the 104-key Cops 30 costs $1,425 from CPC at 1225 Connecticut Ave., Bridgeport, Conn. 06607.

Digi-Log Station Has Zilog Micro

HORSHAM, Pa.— Digi-Log Systems, Inc., has introduced a CRT terminal workstation that incorporates a Zilog, Inc., Z80A microprocessor.

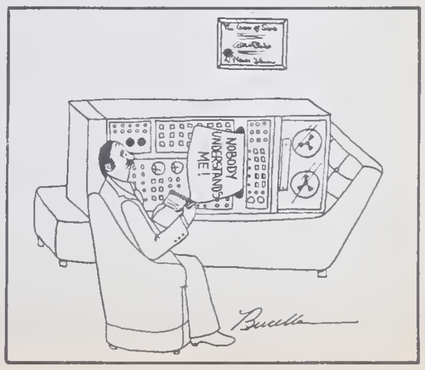
In tests of seven short benchmarks, Microterm II outperformed 21 competitive microcomputer systems, the firm claimed. Results of the benchmark tests, which were written and supervised by Tom Rugg and Phil Feldman of Los Angeles, appeared in the May issue of *Kilobaud* magazine.

Costing $4,000 to $9,000, the workstation uses Microterm II Basic, an extended version of Dartmouth Basic, and incorporates a Basic interpreter that is integrated with minidiskettes, CRT terminals, printers and I/O channels.

The unit typically serves as a data entry terminal, inquiry device or message-switching terminal.

The terminal also allows operators to enter data through the keyboard and, at the same time, receive computer communications for storage or printing, the company added.

Microterm II is available from Digi-Log on Babylon Road, Horsham, Pa. 19044.



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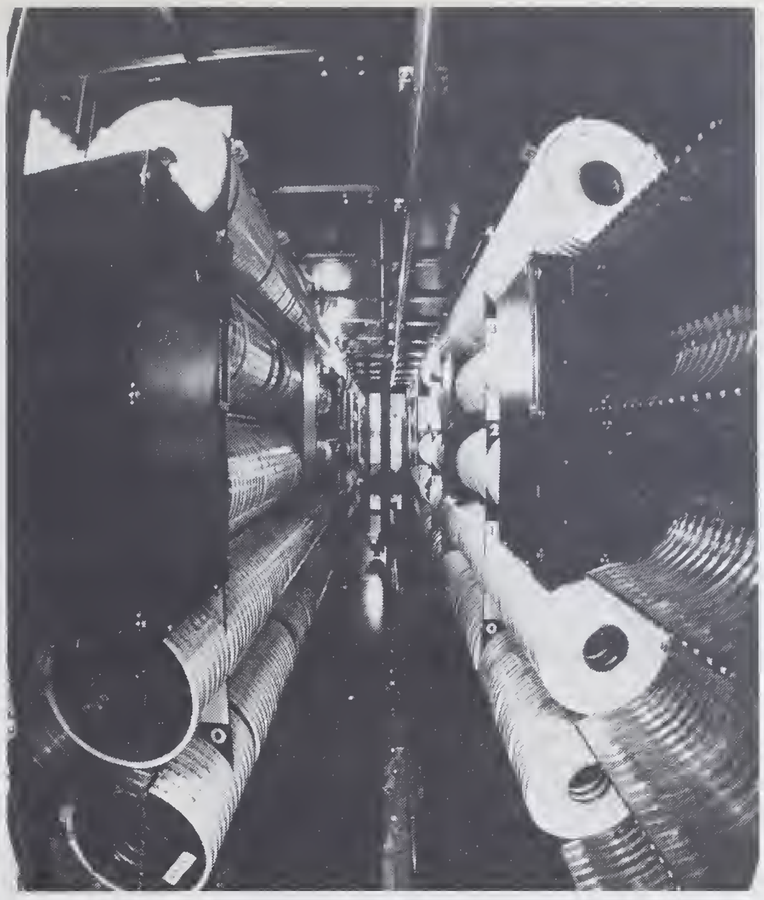
BASF The Original.

Computer Tape Hard and Flexible Disks Cassettes Mag Cards

Automated Library Holds 8,351 Reels, Cuts Labor Costs



An inside view of the Calcomp Automated Tape Library. The unit maintains status, usage and location data on all tape files within the system. The Almsa site is 100 feet long and holds 8,351 tape reels.

By Jeffry Beeler
CW Staff

ST. LOUIS — A programming house here has cut its production staff by 15 and in effect has gained an additional six hours of throughput a day since the organization replaced its manual tape-handling system with an automated tape library.

John Ballard, deputy director of DP at the Army's Automated Logistics Management Systems Activity (Almsa), credited these twin benefits to the library's ability to eliminate many of the production steps and delays that previously characterized Almsa's software development. Because of the personnel cuts, the machine will also trim the programming house's labor costs by an estimated $1.2 million during the next eight years, Ballard predicted.

Billed by its manufacturer as the largest mass data storage and retrieval system ever built, the 1.5 trillion-byte library aids development of the Commodity Commands Standard System, a software package that manages military logistics throughout the U.S.

When an army base places a requisition order, the operating system directs the appropriate supply depot to ship the requested material and makes sure the depleted stock is replenished, the deputy DP manager explained.

Using the automated tape library, Ballard and his staff of about 650 perform an unstructured mix of 600 to 700 jobs a day, he added.

Drives Formerly Used

Before it acquired the automated tape library, Almsa stored and accessed its computer tapes with 19 IBM 3425/7 drives arranged in a giant U. When not mounted on one of the drives, the tapes themselves were stored in large racks in a separate room.

Whenever Ballard and his staff received a job request, they generated a card that indicated the reel of tape that would be required to support the application. They then retrieved appropriate reels of tape from the racks, placed them on a cart and transported them to the room housing the tape drives.

After the reels were mounted on the drives and the jobs were completed, the Almsa staff placed the tape back on the cart, returned it to the racks and refiled the reels in their original sequence.

Unfortuantely for Almsa, this process of manually transporting tape reels back and forth between the library racks and the computer rooms was labor-intensive and involved much duplication of effort, Ballard recalled. It also resulted in numerous DP errors and prevented the staff from keeping its tape file completely up-to-date, he added.

Narrowed Choice

As a result, Ballard and other Almsa officials began as early as 1970 to consider automating their largely manual tape-handling procedure. At first, they evaluated computerized tape libraries from vendors like Ampex Corp., Precision Instrument Co., Laser Stroage Corp. and Data Products Corp., but for various reasons they rejected all those alternatives.

The Laser Storage Unit, for example, cost too much and, as a product that had not yet evolved beyond the prototype stage, it had not proven its reliability to Almsa's satisfaction.

For this reason, the programming house was not willing to take a risk on that particular manufacturer's product. "We weren't heroic enough to go out and spend the amount of money Laser Storage wanted for its tape library and then possibly break our necks trying to make it work," Ballard explained.

The Ampex machine, on the other hand, simply did not fit the software house's application. Ballard considered the product better suited to storing and retrieving archives and similar records than to managing Almsa's tape files, which are accessed much more often and less systematically.

A few years later, Almsa officials considered installing an IBM 3850 and various Control Data Corp. tape libraries. But those alternatives operate only with IBM 370 computers, and Almsa uses a 2.5M-byte 360/65, which the organization intends to keep indefinitely, Ballard said.

The deputy DP director and his associates eventually opted for a

(Continued on Page 57)

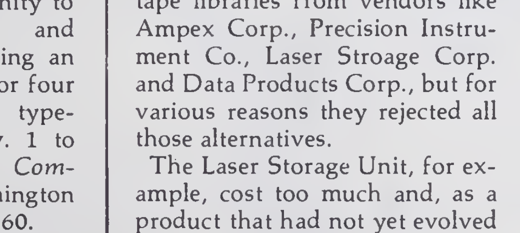
Supplying Security . . .
. . . And Securing Supplies

Tapes, cards, paper and disks . . . Where does it all come from and what are the best ways to get it? And once you've decided on your medium, how do you protect the system on which it produces?

These are some of the questions that will be examined in a CW special report, "Supplies and Security," appearing in December.

How does your company get supplies and how do you get the most out of them? What are the tricks you use to save a few dollars? What kinds of hardware and software techniques do you use to protect your system? Your experiences, successes or failures will be of interest to others.

This is your opportunity to share your ideas and knowledge by submitting an article of 1,200 words or four to five double-spaced typewritten pages by Nov. 1 to Ann Dooley, c/o *Computerworld,* 797 Washington St., Newton, Mass. 02160.



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College Maintains Costs, Quadruples DP Capacity

Schueppel observes a student at Madison Area Technical College.

MADISON, Wis. — The Madison Area Technical College here replaced a batch-oriented system with an on-line system and reports significant benefits with no increase in cost.

The college claims a fourfold increase in DP capacity and capabilities, a 100% increase in programming productivity and efficiency, easier system access for all users, a reduction in turnaroud for users from as much as 24 hours to three hours or less and an ability to expand without conversions or proportional increases in staff.

The college serves about 35,000 people at a main campus here, a separate technical center and five other locations within 100 miles. Courses and programs of study are administered in six major divisions, including agribusiness, business and marketing, general studies, health occupations, home economics and trade and industry, according to Warner Schueppel, DP supervisor.

The college installed its first CPU, an IBM 1620 with 20K bytes of main memory, in the early 1960s. The system was initially used for an associate degree program in DP, following which usage was expanded to include administrative applications such as student registration and student accounting, he explained.

In 1966, a 32K-byte IBM 360/30 was installed to further develop administrative applications and to serve an increasing number of DP students. The system was upgraded to a 128K-byte 360/40 in 1970 and memory was increased to 384K bytes in 1972. The growth was brought on by increases in administrative applications and usage by accounting students as well as those in DP.

In 1974, a Data 100 Model 70 remote batch terminal was installed to provide system access to engineering as well as accounting and DP students, bringing the total number of students using the system to about 900. At the same time, applications expanded in administrative areas and further demands were received for increased usage in the future.

Saturated in '75

However, by 1975, the system was saturated with applications, limiting the possibilities for growth. In addition, access to the system was not only inefficient, but even unacceptable from the standpoint of turnaround times, which were running as much as 24 hours, Schueppel noted.

At that point, the college developed a five-year plan to not only increase system power for DP but also to install on-line capabilities to provide an interactive environment and reduce turnaround times. However, because of budgetary restrictions, the plan had to include no increase in cost, he explained.

A task force representing all affected groups in both the college and the community developed specifications for the required new system and evaluated proposals made by a number of different vendors. Based on the task force evaluation, the board of directors approved a recommendation to install a Univac 90/60 system. The 90/60 was selected because it not only met all specifications at no increase in cost but also provided the lowest cost of all systems studied.

"The system provides four times the capacity and capabilities of our previous system at the same cost," Schueppel stated. "Previously, we were running three shifts: 24 hours a day, five days a week plus eight to 16 hours on weekends on numerous occasions. Now, we're running more work with only two shifts or 16 hours a day. The third shift has been eliminated and actually, the DP could all be handled in one shift if there was no need to keep up two shifts a day for user conve-

(Continued on Page 56)

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For Blue Cross, Welfare Claims

Tapes Improve Hospital's Cash Flow, Billing

By Stephen L. Priest
And Robert L. Sheehan
Special to CW

BROCKTON, Mass. — The Brockton Hospital here is attacking the problems of cash flow and claim errors by sending magnetic tapes for third-party billing to Blue Cross of Massachusetts and the Massachusetts Department of Welfare.

The Blue Cross tapes contain the Blue Cross and Medicare A outpatient claims and the welfare tape has claims for outpatients, discharged inpatients and 30-day interim in-house patients.

Under the previous method, a paper claim form was prepared by the hospital's in-house mainframe for each Blue Cross outpatient claim four days after service. The claims were reviewed for accuracy by a clerk in the hospital's patient accounting department and then forwarded to Blue Cross for approval and payment.

Blue Cross sent the forms to a service bureau for keypunching. The completed 80-column punched cards representing the claims were fed into the Blue Cross DP system and a magnetic tape was created. The tape was then edited for format errors.

Any tape claims with format errors were rejected as incomplete claims and a printout explaining the incomplete claims was returned to the hospital along with a listing of paid claims and contractual rejects.

The hospital then investigated the claims that were in error and returned another paper claim form to Blue Cross and the data preparation and editing process was repeated.

If the claims had no format errors and payment was approved, the hospital would receive a reimbursement check in three to six weeks from the day the claim forms were originally prepared at the hospital. If a claim was rejected because of a format error, it took an additional three to six weeks since the hospital had to resubmit the claim, assuming no format errors the second time.

As with the Blue Cross claims, the hospital previously prepared and reviewed the Medicare A claims before forwarding them to Blue Cross, the intermediary for Medicare, for approval and payment.

The Medicare A claims were then controlled, reviewed and coded before being entered onto magnetic tape. The tape was processed by the payment system with questionable claims suspended for further investigation. Suspended claims were usually handled by telephoning the hospital directly.

The reimbursement time was usually two to four weeks from the day the claim forms were originally prepared by the hospital.

Updated Procedures

The hospital has now implemented two distinct strings of programs and reports for both Blue Cross and Medicare in order to meet their individual edit and tape format requirements. These separate systems are similar with respect to workflow patterns.

The Blue Cross and Medicare outpatient visits are edited for data errors the day the outpatient visit is established in the hospital's DP system. The initial Blue Cross and Medicare edit exception reports noting the format errors are delivered daily to patient accounting. If patient accounting can correct the format errors before a claim is ready for billing, then the claim will not be delayed in the normal billing cycle.

Once a week the claims due for billing are extracted and put through an extensive edit. The final edit reports are given to patient accounting for correction and resubmission for tape billing.

The claims that pass the hospital's edit go on tape. The tapes are then read and lists are produced of the claims on the tapes along with controls of total amount and number of claims billed. Comparisions are made to insure that only readable and valid tapes are sent to Blue Cross. The completed tapes are delivered to Blue Cross for processing. A payment check for the approved claims on the tapes in usually ready in seven days.

The savings to the hospital with the new system are:

- No storage space or inventory system is necessary since there is no paper form.
- There is a reduction in computer and operator time as magnetic tape is several times faster than hard copy.
- The clerical time necessary to review the printed claims is eliminated.
- There is a faster turnaround time in claim payments, which resulted in a one-time reduction in accounts receivable of nearly $70,000.
- A faster paid claim results in postage savings and less patient confusion in that third-party accounts unpaid after eight weeks are also billed directly to the patient.

Some of the savings to Blue Cross are:

- No forms have to be purchased or stored for hospital claims.
- No data preparation is required from printed forms and more efficient data entry procedures are possible.
- No claims are rejected because of

(Continued on Page 57)

OCR SAVES MONEY

How Erie County, NY saves over $300,000 a year with OCR

It's a fact that most county government data processing departments have very tight budgets . . . and Erie County, NY is no exception. Gerald E. Wilson, Erie County's director of data processing recognizes that up to 30% of the cost of the average county government computer installation is in data entry. He initiated their use of OCR to cut those costs.

After careful evaluation they selected the Laser OCR-One optical character recognition system. Just one example of how Erie County cuts their data entry costs with the Laser OCR-One is their county nurses reporting system. This innovative new system alone saves at least $5,280 a week!
An added bonus is more meaningful management reporting.

Despite a 15% staff reduction in their data processing department, Erie County has achieved a 16% increase in efficiency in 1975 and an additional 10% in 1976. Jerry Wilson says, "We really couldn't have gotten by without scanning and our Laser OCR-One."

For information on how you can cut data entry costs, contact

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Monitors Help Tighten Firm's DP Operations

By a CW Staff Writer

NASHUA, N.H. — With the help of hardware and software monitors, Sanders Associates, Inc. was able to eliminate one full shift a week, and another half shift on the weekend is also being thinned, according to Al Raine, Sanders' computer performance evaluation (CPE) specialist.

Sanders also has been able to evaluate 52 software packages in the last three years and will evaluate another 12 in the next 12 months through the use of the CPE monitors, Raine said recently.

Raine was the company's manager of systems and programing before he became the CPE specialist. He admitted having had no understanding of a computer systems operating environment and remarked about his CPE function "it is fascinating to get inside an IBM 370/158 operating system and see how it works."

The Sanders DP shop has a 4M-byte 370/158, 14 single- and double-density disks, a 3705 front-end processor and a 3704 controller supporting the interactions of 100 3270-type terminals under IBM's IMS for on-line and batch applications, while concurrently running IBM's Time-Sharing Option (TSO) during the company's prime shift.

The firm also has a Digital Equipment Corp. PDP-10 supporting 65 terminals. The standard turnaround, according to Raine, is four to five test shots per day per programmer.

Sanders had IBM equipment exclusively at one time and was able to become a "super multivendor shop" with 15 different vendor's hardware and software from 10 different vendors because of the monitoring equipment and packages, Raine noted.

Hardware Monitors

The company has used Comten Inc. monitors to test Honeywell, Inc., Univac, Burroughs Corp., Digital Equipment Corp., IBM, Xerox Corp. and General Electric Co. CPUs, Raine noted.

In addition, Tesdata Systems Corp. makes a range of monitors and the government has some of its own for its systems, he added.

The primary characteristic of hardware monitors is passivity. They won't cause a system crash, as will alternative methods such as "hot probes," according to the CPE specialist.

The monitors have a programmable plug board. The result, he explained, is an absence of system overhead and channel overhead while posing no interference problems to the system under test.

A hardware monitor can help the user save money if the analysis of test data shows that the processor or the system as a whole is being underutilized, Raine said.

The monitor can tell its users if there are bottlenecks and where these problems are located within the system, he said, adding user intelligence is necessary to divine the test results.

A monitor can define device utilization, and can measure the data path or content overlap of the CPU, memory and other system components simultaneously. It can also be used on a processor regardless of vendor, he noted.

Once the problem has been found, a user can spread the processing workload among other devices in the system, he said.

But hardware monitors entail capital investment from as little as $10,000 to more than $100,000. They also require skilled analysts to interpret the reported data and to make the necessary recommendations to management, Raine advised.

Vendors of the monitoring equipment usually give the user a probe point library and a list of ways to determine if users are getting the appropriate responses.

And hardware monitors, as well as software monitors, are dependent upon the DP shop where they are used, the applications being run, devices in the system and the workload. "You may not get a utilization any higher than 65%, unless you consider downgrading," Raine cautioned.

When using any monitoring tools, the user must have a planned program of objectives, in addition to management knowledge and support of the project, he advised.

"Otherwise, you will fight an uphill battle. Moreover, no director of DP wants to hear that he is not running the greatest shop in the world," Raine said, stressing diplomacy is essential in reporting the test results.

"Make a report, but don't blast people's functions. Put it in hard copy and make it graphic, if possible," he suggested.

Software Monitors

Advantages Raine attributed to software monitors are their comparatively low cost, the ability to identify data set names and usage characteristics, and greater flexibility compared with their hardware counterparts.

Some software monitors cost less than $1,000. They are usually simple to use because they are parameter-driven and the learning process is relatively short, he said.

The software monitor should provide a standard pool of measurements and information on specific applications programs, as well as be able to specify exactly what the user wants to measure.

There are problems with software

(Continued on Page 57)

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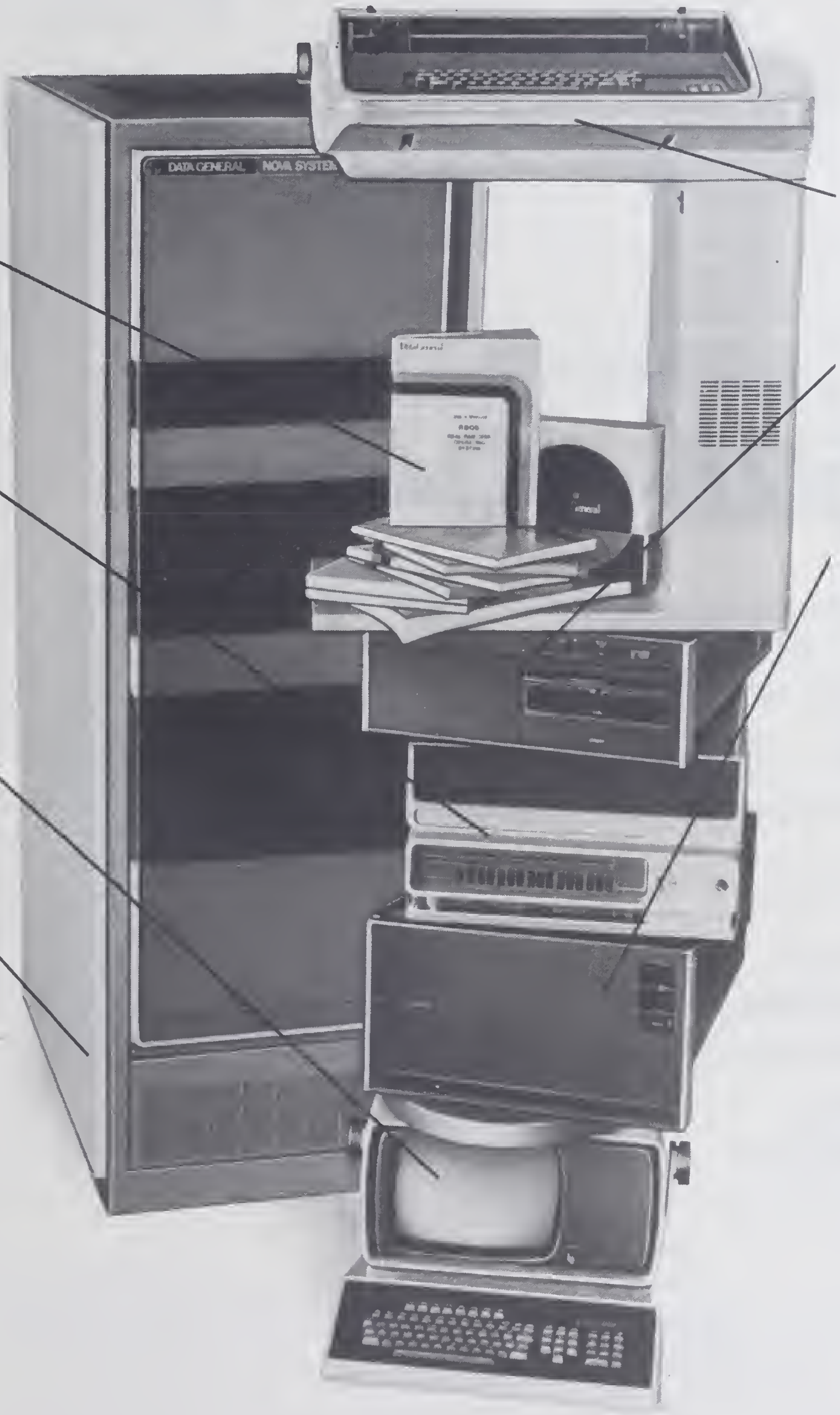

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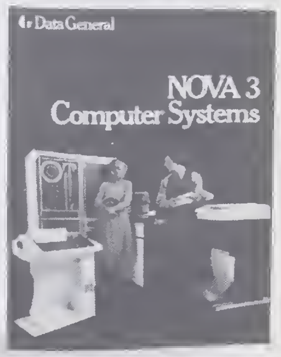

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Light Pen Reads Mixed Bar Codes

SOMERVILLE, Mass. — Ames Color-File Corp. has introduced a bar code data entry system that includes a terminal and light pen and reportedly features two-way communications with a host CPU.

A multiple decoding ability allows the light pen to read mixed types of bar codes, a spokesman added.

With four function keys, the terminal can receive and display up to 15 numeric digits: four annunciator lights are present for operator prompting. The unit accommodates synchronous and asynchronous communications, the spokesman said.

The light pen can read a combination of bar codes including Ames, Codabar and the Universal Product Code.

The Model 810 Ames Guiding Light multiplexer concentrates up to 16 data entry units into a single port, allowing simultaneous use of the pens with no discernable delay to the system, the vendor claimed.

The multiplexer alone costs $3,000. The CRT terminal with keyboard and light pen costs $1,200; without a keyboard, the terminal costs $750. Ames Color-File is at 12 Park St., Somerville, Mass. 02143.

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Bits & Pieces

Planning Seminars Slated

ROCKVILLE, Md. — Keston Associates has announced a fall/winter series of five-day workshops on "How to Develop an Effective Long-Range DP Plan."

While effective long-range planning has long been an important objective of DP management, it has rarely been achieved in practice, according to the firm. The workshops, it noted, take a positive approach to establishing a viable planning mechanism as a means of controlling the DP function.

A set of planning methods and procedures is presented in the course, including: a technique for the projection of future user requirements: a mechanism for mediating between competing user priorities and a procedure for estimating impending hardware, software and personnel needs, the firm claimed.

The workshop taught by Dr. Robert Keston will be presented in Washington, D.C. on Dec. 5-9 and on Feb. 27-March 3; in San Francisco on Nov. 14-18; in Los Angeles on Jan. 23-7; and in Clearwater, Fla., on Feb. 6-10.

The workshop fee is $595 per person, including luncheons. Keston Associates is at 11317 Old Club Road, Rockville, Md. 20852.

Microfilm Standards Topic of Book

WASHINGTON, D.C. — The National Micrographics Association (NMA) has published *Basic Microfilm Standards*, a collection of the five American national standards specified in the Internal Revenue Service (IRS) Revenue Procedure 76-43 which covers microfilming of general books of account.

Also included in the book is a copy of Revenue Procedure 76-43, NMA *Recommended Practice for Inspection and Quality Control of First Generation Silver Halide Microfilm*, which provides general information on this subject, and Resource Report 1, which is a directory of all micrographic standards.

While this collection of material relates specifically to the IRS revenue procedure, it should also be of value to anyone developing or operating a micrographic system, particularly if he is concerned with archival permanence, the association said.

Selling price of the package is $8.50 for NMA members and $11 for nonmembers from NMA, Publications Sales, 8728 Colesville Road, Silver Spring, Md. 20910.

DP Capacity Quadrupled

(Continued from Page 50)

nience.

The system also provides on-line capabilities which make it possible to achieve a 100% improvement in programming productivity and efficiency, he claimed.

"Students and faculty now have direct on-line entry to the system, making it considerably more accessible to them," he explained. "Access is also easier because there is less to learn on the part of the user. In addition, turnaround times for use working with the system in a batch mode are reduced from as much as 24 hours to three hours.

Capability to Expand

"We also have the capability to expand without any conversions or the need for a proportional increase in staff," Schueppel said. "The system is upgradable to meet our needs over the next five years through four or five additional steps, including doubling of the main memory. At the same time, the system provides more efficient operating capabilities which will minimize the need for additional personnel as growth takes place."

Under the direction of senior programmer Edward C. Sheard, who served as project leader, conversion to the new system began in August 1976, with the aid of Univac, which provided on-line access to a remote-job test facility in Blue Bell, Pa., as well as equipment and personnel. Installation was begun in October and the system was accepted in January 1977.

Consisting of a 1M-byte main memory, four 100M-byte disk drives, four 9K-byte tape drives, a 1,400 line/min printer, a 1,000 card/min reader, a 300 card/min punch and multichannel communications controller, the 90/60 system is operated with six Uniscope 200 CRTs and eight asynchronous terminals.

Four of the CRTs are used internally for on-line administrative programming and two are operated in the computer center for on-line student and faculty use. The eight asynchronous terminals provide on-line service to students and faculty at the college's technical center. In addition, batch facilities previously operated in the computer center are being retained for use in problem-solving modes and by beginning students.

Automated Library Cuts Labor Cost

(Continued from Page 49)

California Computer Products, Inc. (Calcomp) 7110 automated tape library, which began test operation on April 15. Since that time, the 100 ft-long unit, which holds 8,351 magnetic tape reels, has averaged between 98% and 99% uptime, Ballard said.

Besides the mainframe itself, the mostly IBM configuration incorporates three 1403 line printers, model 2314 disk drives and Itel Corp.7330 disk drives.

With this configuration, Almsa can store in the Calcomp automated library most of the reels that originally resided in the tape rack. This proximity to the drives has eliminated the manual transporting of magnetic tape from room to room and many of the "runners" who had been hired to perform that chore, Ballard said.

The current system also allows the Almsa DP staff to mount a tape within 12 seconds of the time the reel is requested, he added. And when the programming house finishes writing some "optimization software," mounting times will shrink even further to about five or six seconds, Ballard said.

Monitors Tighten Jobs

(Continued from Page 54)

monitors, however, he said. They add system overhead on the CPU, channels, devices, memory and other components; the monitor is unable to run a test on itself; there are periodic maintenance and software fees on some; and they are incapable of some specific measurements, according to Raine.

Software monitors also lack the ability to define and measure concurrent events, he said.

Despite the drawbacks, Sanders was able to detect a 40% overstatement during the week from the on-line IMS/-TSO application and an 8% overstatement on the weekend shift, when the system was running in a batch mode, he said.

"I thought it was about a 10% error factor, but the monitors demonstrated there was a 50% error factor of total CPU time," Raine said, recalling Sanders' test results.

Datek Releases Printer Books

FITCHBURG, Mass. — Datek of New England has published two books describing the printout devices shown at the National Computer Conference in Dallas and at the Hannover Fair in Germany.

The booklets, *Printout NCC '77* and *Printout Hannover '77*, each contain 24 pages of photos, technical information on printers, background on the shows and an address listing of all the firms exhibiting printout equipment.

The booklets cost $15 each from Datek at 150 Main St., Fitchburg, Mass. 01420.

Tapes Improve Medical Billing

(Continued from Page 51)

format errors.

The hospital has recently implemented another magnetic tape system in which inpatient and outpatient claims are submitted to the Massachusetts Department of Welfare. The system bills in-house patients in 30-day intervals as well as complete welfare billing for both state and hospital end-of-years. Claim payments are being made in three weeks instead of the previous time of two to three months. The one-time reduction in accounts receivable is expected to be nearly $80,000.

The programs and reports are similar to the Blue Cross and Medicare systems.

The introduction of magnetic tape has expedited the hospital's combined cash flow for Blue Cross and Medicare A outpatient reimbursement from approximately four weeks to seven days. The hospital's ability to edit for format errors has reduced the paperwork of claims in error to a negligible number. Other savings to the hospital are additional storage space availability and a decrease in CPU run time.

The use of magnetic tape for submitting Massachusetts Department of Welfare claims is significantly reducing the hospital's accounts receivable as cash flow has gone from three months to three weeks.

The patient benefits financially as the hospital, Blue Cross, Medicare and the welfare department attempt to control costs. Also, elimination of third-party delays due to format errors results in less patient confusion, sometimes caused by the receipt of hospital bills which are expected to be paid by the third party.

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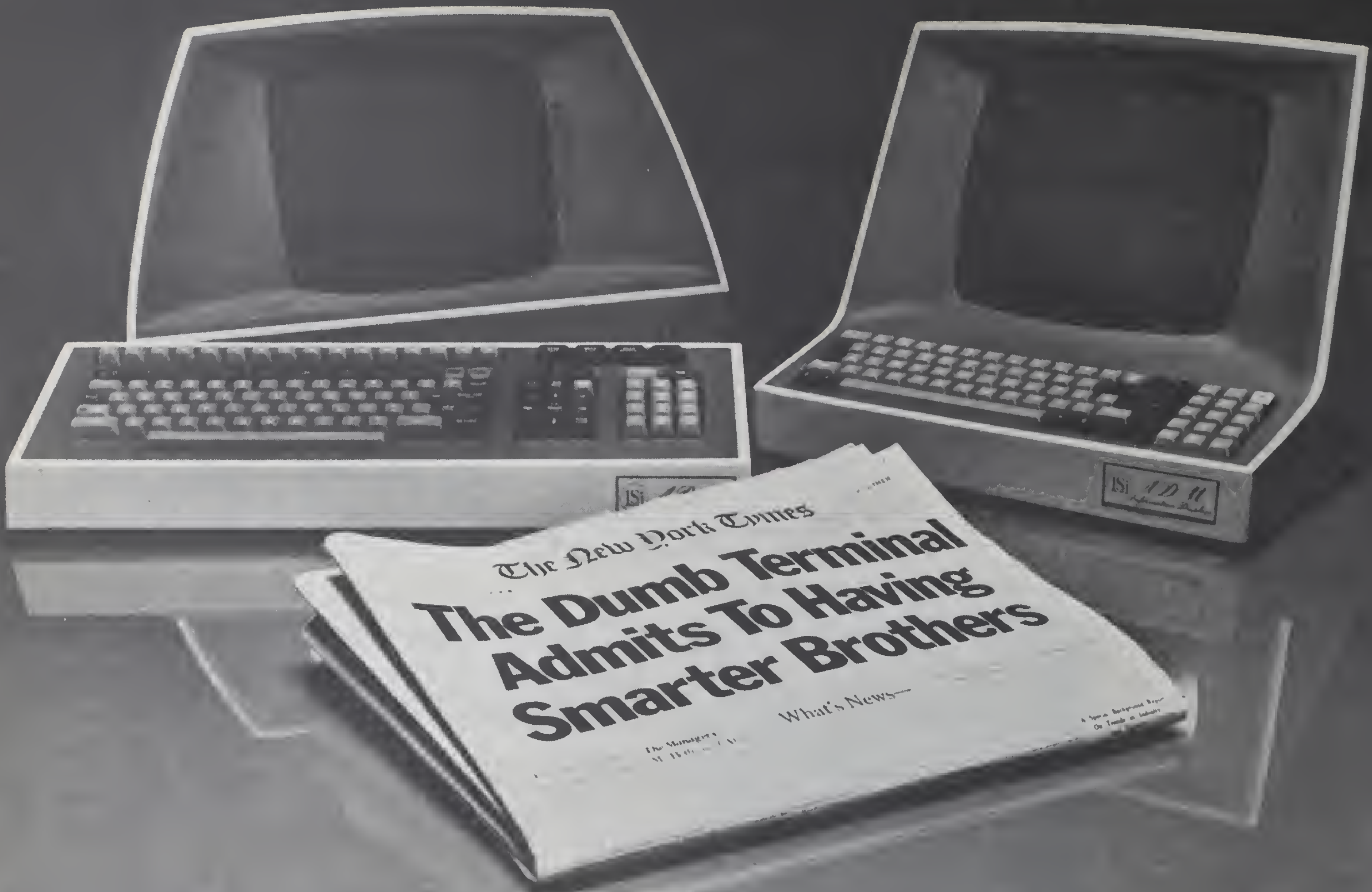

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Path for 399, 499 Users

NCR Unwraps I-8100 For DP Novices

By Esther Surden
CW Staff

DAYTON, Ohio — NCR Corp.'s introduction of the T-8100 series of interactive small business systems last week clarified that company's commitment to inexperienced computer users previously served by the firm's 399 and 499 ledger card systems.

In about the same price range as the 399 and 499, the two members of the I-8100 series are on-line, interactive, transaction-oriented systems that are compatible on the object code level with the firm's mid-range and large-scale systems. They are in the IBM System/32 and Burroughs B80 class of systems, NCR said.

The I-8130 and I-8150 can also be used as nodes in a distributed processing network functioning under the company's Distributed Network Architecture or using binary synchronous communications.

Several of the systems can share the same files, NCR noted, adding a file lockout feature protects files under this scheme.

Both models run programs written in Ansi Cobol 74. A variety of industry-oriented application packages designed for installation on a load-and-go basis will be available. No provisions for user modification of these programs have been made, the firm said.

No Direct Upgrades

Present NCR 499 uses will not be able to upgrade directly to the systems, a spokesman admitted, but the company reportedly plans to support the 499 for as long as it is still a viable product.

An optional visual record printer is designed to appeal to those who still require ledger cards or cut forms, NCR said.

Each of the I-8100 systems is built around three distinct microprocessors, distributed within the system according to function. As features are added to the system, more micros are added, another spokesman pointed out.

The basic version of the I-8130 includes the multiple processors with 48K bytes of memory, two floppy disk drives that can store up to 1M bytes of data, a 50 line/min bidirectional matrix printer and a 9-in. CRT.

This system is not user-programmable; it will, however, run programs compiled on the I-8150, NCR said.

Memory for the I-8130 is expandable to 64K bytes and users can add more floppy disk drives, cassette tape units and a range of printers, the spokesman added.

The I-8150 differs from the I-8130 in storage. It includes a 5M-byte integrated fixed disk and a cartridge tape drive that can accommodate up to 2.5M bytes of storage. Up to 40M bytes of disk can be added to the system, according to the spokesman.

Several features have been designed with "human engineering" in mind, still another spokesman noted. The CRT, for example, features characters that are "about 25% larger than on a typical CRT."

A restart protection option allows users to power up after an outage at the same point processing was interrupted, he said.

Both systems and applications software are unbundled, the company noted. Operating software for the system is called the Interactive Direct Processing System and, according to NCR, programs written under it can be transported to larger NCR systems running under the Interactive Multiprocessing Operating System and the Interactive Resource Executive.

Announced for use with the I-8100 series was the Model 7281 CRT, suitable for remote inquiry device or remote data entry. "It operates like a key-to disk system" with valid transactions written to disk all at once, a spokesman said.

Industry application packages will be

(Continued on Page 60)

Industry application packages will be available in the first quarter of 1978 for the I-8130 pictured here.

DEC Enhances PDP-8 Line

MAYNARD, Mass. — Digital Equipment Corp. has enhanced its established PDP-8 minicomputer line by adding three more PDP-A processors and several options that effectively expand to 128K bytes the amount of memory users can have.

Prior to this enhancement, the processors could only handle 32K bytes of memory, a spokesman noted. The enhancements therefore provide users with up to four times the amount of memory previously available.

The three processor models introduced were the basic PDP-8A/205 system; the PDP-8A/425 system, based on a single-board 1.5 microsec CPU; and the PDP-8A/625, based on a multiple-board 1.2 microsec CPU.

Memory Management

The KT8-A memory management option that allows the systems to address the expanded memory sizes can be added to present PDP-8A configurations using more than 32K words of core, DEC noted. Another option, the MS8-C, a MOS memory module, is available in both 16K- and 32K-word configurations and uses 4K random-access memory chips.

The KT8-A and MS8-C modules are also available to present PDP-8A users who wish to upgrade their systems to 128K bytes, the firm noted.

Users can mix core and the MOS memory on their systems, the spokesman added. This allows a user, for example, to keep programs in nonvolatile core and expand the data base in MOS, he explained.

The systems are software-compatible with previously available PDP-8/A systems, DEC said. The KT8-A option features extended virtual field addressing, memory protection and reduced operating system overhead, the spokesman claimed.

The 16K-word PDP-8A/205 costs $3,900; the 128K-word PDP-8A/625 costs $18,050. The 16K- and 32K-word MS8-C memory modules cost $1,900 and $3,100 respectively.

Deliveries of the processors will begin in November, DEC said from Maynard, Mass. 01754.

DDP Flies Savings To Air Cargo Firm

By Esther Surden
CW Staff

STAMFORD, Conn. — Distributed data processing (DDP) is paying off in improved customer service, freight consolidation cost reductions and reduced paper work at Air Express International Corp. here, according to the firm's DP manager.

Air Express's distributed system now includes three Four-Phase Systems, Inc. minis and one IBM 32, Bill Romano said. The systems are not linked together nor do they communicate to the company's mainframe system. Information is spun off to tape or written on floppy disks which then are

(Continued on Page 60)

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APL Unit Based On DEC Micro

HARTFORD, Wis. — The APL/X3 from General Robotics Corp. (GRC) is an APL system based on the Digital Equipment Corp. LSI-11 CPU.

Packaged in a 16-slot backplane with 28K words of MOS memory and including an extended instruction set and floating-point arithmetic, the unit runs under DEC's RT-11 and APL/RT-11 operating software, GRC said.

Also included with the APL/X3 is an APL CRT with 24 lines of 80 characters, full overstrike capability and an APL printer that operates at 60 char./-sec.

Enclosed in a "data desk," the system costs $27,500 from GRC at 57 N. Main St., Hartford, Wis. 53027.

Turnkey Does Warehouse Jobs

BEDFORD, Mass. — Distribution Management Systems, Inc. (DMS) has an on-line warehouse inventory and operational control turnkey system that can be configured with either the Digital Equipment Corp. PDP-11 or IBM Series/1 minis.

The system provides tools and facilities for picking and packing, inventory location and control, shipping and receiving, personnel performance, warehouse management, reporting and communications with a centralized order entry system, the firm said.

The unit keeps a map and count of all items and directs shipping and receiving through a cost-optimized routing process, DMS said.

The turnkey costs about $75,000 for a system using either the DEC or the IBM processor with 96K bytes of memory, three terminals (one of which produces hard copy, a 180 char./sec printer, two disks with a total capacity of 10M bytes and some communications capability. The company can be reached at 11 DeAngelo Drive, Bedford, Mass. 01730.

DDP Delivers Savings to Firm

(Continued from Page 59)

transferred to the host system.

The company is using the distributed systems to help consolidate the freight it carries. Air freight companies compete with airlines for freight business and charge competitive prices. But they offer additional service. Air freight firms will pick up freight at a customer's location and deliver it to its destination within a set period of time, according to the rate a customer pays.

"We make our money in consolidating your freight with other people's". Romano explained. The consolidation process, formerly done manually, is now controlled by the small systems.

The systems print out lists of freight according to assigned flight — in proper sequence — and an interim manifest is created. From this, workers can locate the freight and put it with the correct cargo going on the same outbound aircraft. After this operation is completed, an operator updates the system.

"We like to close out a flight as late as we can and the computer allows us to prolong the closeout," he emphasized.

A printout of the final manifest goes to the individual airline carrying the cargo to satisfy all their flight regulations.

Very soon the company will have another application running on the small systems. They will prepare "international house bills" which satisfy customs and other unique requirements of destination countries.

The distributed sytsem has been "clearly justified," Romano stated. "We have a well-established central computer facility," but it "is basically sequential in nature," he explained. The system couldn't support the processing at the operational end of the business, so the firm decided to "go the path of least resistance" and give the users their own system.

Before settling on the Four-Phase systems, the company investigated a number of different vendors, Romano said. The ANS Cobol "on a rental-based system at a reasonable price" turned the tide toward Four-Phase. The company's IBM 32 was selected because there was an application package written for it that the company wanted.

NCR Has I-8100 For DP Novices

(Continued from Page 59)

available in the first quarter of 1978 for manufacturers, wholesalers and distributors, restaurants and educational, governmental and health care institutions. General accounting applications such as payroll, general ledger, accounts payable and accounts receivable will also be available in packaged form at that time.

The I-8130 operating software is licensed at $60/mo while the I-8150's costs $70/mo. The Cobol compiler has a fee of $30/mo. Application package fees range from $25- to $90/mo.

The basic I-8130 carries a $19,970 price tag and the I-8150 costs $29,200. Monthly rental prices are $656 and $831 respectively on a three-year agreement.

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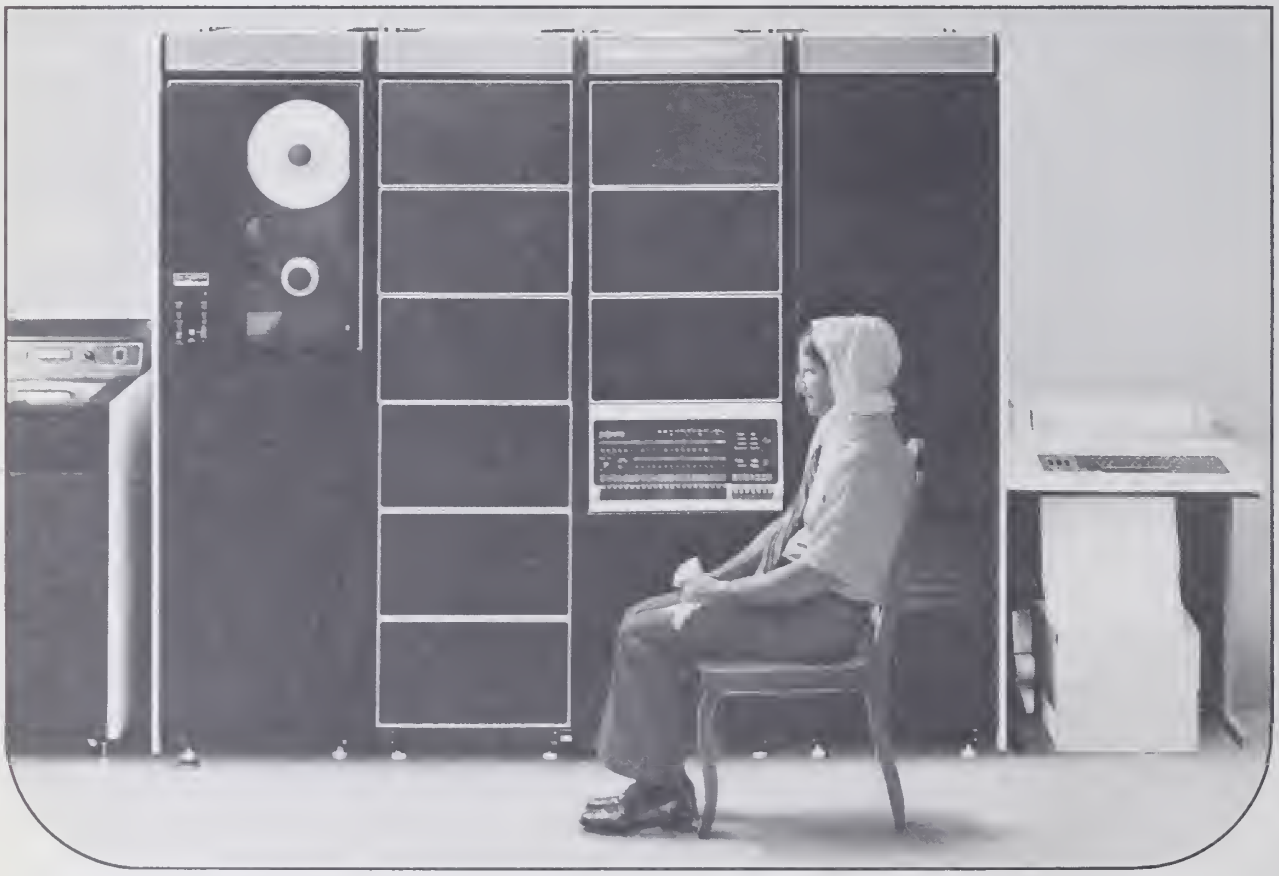

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Users' Prayers Answered by Network of Minis

By Ann Dooley
CW Staff

MILWAUKEE — The Sisters of the Sorrowful Mother, a religious order here, is devoting a minicomputer network worth over $1 million to administration work in 16 hospitals throughout Wisconsin.

Six of the hospitals are operated by the nuns, while the other hospitals have contracted for the order's DP services. The hospitals range in size from 60 beds to 420 beds.

The DP work was previously done by batch processing using non-intelligent terminals, but as the hospitals grew larger they required more sophistication, according to Paul Solberg, director of DP.

The decision to go to a mini system was made about a year and a half ago in order to give the hospitals better and more timely information, Solberg said. The system was also expected to give them more local control for their specific needs.

The system now includes dual central NCR Century 201 mainframes, CRTs, a 300 line/min printer with integrated cassettes, an NCR 8200 in four hospitals and a Model 736 magnetic tape encoder for key-to-tape terminals in one hospital. It also includes 10 NCR 7200 terminals for off-line data entry on key-to-tape sets.

Review Not Detailed

Some system review took place at the time of the changeover to the minicomputers, but it may not have been as detailed as it should have been, Solberg admitted.

"We had some immediate needs to fill and the 8200 came out on the market at the same time, so we used it," he recalled.

The order is currently investigating smaller terminals for those hospitals not already on the 8200s and hopes to have them installed by next spring, according to Solberg. The smaller hospitals don't need as much sophistication, which should keep costs down, he added.

The system handles such applications as inpatient/outpatient records, accounts receivable, payroll, general ledger and medical audits. Most of the applications are performed in the same way, Solberg said.

All the relevant information is batched. The data is keyed into the 7200 data entry terminals and put onto cassette tape where it is automatically transmitted to a disk file.

The minicomputers have been programmed to put all the individual transactions onto one major transmission file and send the file to the Milwaukee center. This procedure is done on a daily basis, Solberg said.

At the DP center, the data is processed and put into a master file. All the necessary report material for the hospitals is then generated and transmitted back to the hospital. The reports also indicate what kinds of reports should be printed at the specific hospital.

The reports are printed at each hospital since the selection process is different for each one, according to Solberg. In this way, the hospital can have customized reports.

The center keeps a two- or three-day backup on all the data, he added.

Separate Data Bases

A mini data base has been incorporated at each hospital with an 8200 so these hospitals can have some inquiry capability. Eventually, the plan is to follow patients from the time they are admitted to the time they are discharged.

As they come in, the information from the CRT would be transferred to a disk file automatically. In this way, all information on a patient can be kept in one file and handled directly at the admissions office.

The hospitals would continue to transfer any data to the center, which would require a mainframe capability, for needed upkeep of the central data base.

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Gives More Control, Security

CPA Firm Finds Going In-House Makes Change

WELLESLEY, Mass. — Better control, tighter security and faster turnaround — those are the reasons many users give for switching from a service bureau to an in-house system.

The Wellesley office of LaFrance, Walker, Jackley and Saville here is one such user, according to the partners in charge.

Small to medium-sized manufacturing, trading and other concerns comprise the main portion of the CPA's client base.

When asked why a small firm of certified public accountants (CPA) would consider an in-house computer, Charles Morse, one of the partners, explained, "Our primary reasons was to improve turnaround time on clients' information."

The principal workload of the firm is general ledger and financial statement preparation. Information is input from footed journals, which are totals from the clients' various journals. This input is then used to prepare the general ledger and, as a by-product, a financial statement.

Time is often a critical factor in this operation, according to Morse. "Sometimes governmental agencies, banks, lending institutions or boards of directors have very critical time deadlines by which they must see information.

"Security is also very important," he added. "We do not like client information leaving the office."

During a typical working day, a member of the firm travels to 'a client's premises and meets with the client's bookkeeper or clerk who has prepared posting journals from the books of original entry.

Several hours are spent checking that information and preparing corrected or updated entries. The results are then brought to the accounting office, where the general ledger and financial statements are updated and completed.

"Before we purchased our Wang Laboratories, Inc. system, we relied on an outside service bureau for general ledger and financial statement preparation," Morse said.

"We were using an optical font adding machine at our office," he continued. "This produced computer-recognizable numbers which were scanned optically at the center. These were then converted to magnetic tape, which was sent through the computer.

"This process typically involved a five- or six-day waiting period, just to get our information returned. Sometimes we received information back and found we had to make a change either because of a client error, our error, a service bureau error or because the computer made a mistake.

The CPA firm went in-house also because "we felt in the long run we would realize a dollar saving," Morse said. "The cost of the outside service bureau would be approximately equal to what we would be spending to amortize our own system."

Now when a client's information is brought to the firm on a series of posting journals, it is input into one of the floppy disks of the Wang WCS-20 system. That information is then integrated into the previous history record (which was stored on the client's disk) and an updated history record is produced.

The system then runs off financial statements, such as a balance sheet or income statements.

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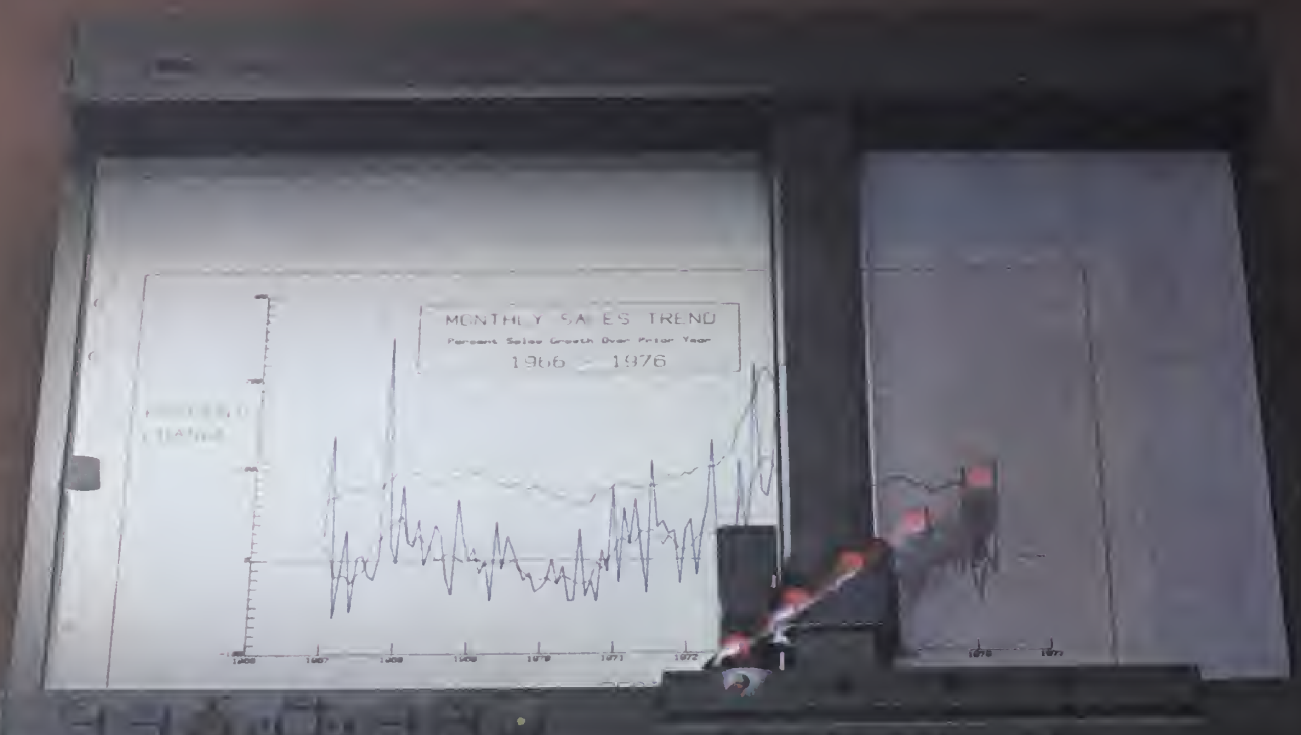

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L&W Unveils Process Control CPU

NORTH WALES, Pa. — Another process control CPU is available from Leeds & Northrup Co.

The Memory Management CP400 processor contains hardware for memory mapping. The system's memory is expandable to 128K bytes. The unit is designed for use in the firm's LN5400 system, a spokesman noted.

The system is said to "meet the need for larger and more complex programming for real-time process control applications; and it reportedly reduces address space conflicts, bulk waits and thrashing situations.

The processor is made up of two dedicated units. One is devoted to I/O functions, while the other performs regular CPU operations. The system features a real-time clock and power fail detection. Standard software includes executive, I/O, background, utility and application programs, the firm said.

Although the company could not pin down a price for the system, it said prices range anywhere from $500,000 to $3,000,000. Delivery is from nine to 18 months, he said.

The Leeds & Northrup Co. Systems Group is located on Dickerson Road, North Wales, Pa. 19454.

Cache Unit Fits PDP-11/34

SANTA ANA. Calif. — Able Computer Technology has a cache buffer for the Digital Equipment Corp.

Most software consists of reiterative loops or subroutines, the vendor explained. Cache/34 is designed to use a "write-through" algorithm for all computer read-from-memory operations. A 1024 block address and the corresponding data are mapped into the cache so that, on subsequent operations, data is supplied by the buffer for any address which has already been mapped, Able noted.

The unit is contained on a single circuit board. It installs in "less than five minutes" Able claimed, and requires no adjustments or software changes. A switch on the board permits a choice of either on-line or off-line operation, the vendor added.

The unit costs less than $4,500 Able said from 1616 S. Lyon St., Santa Ana, Calif. 92705.

System Bows

CHARLESTON HEIGHTS, S.C. — A small business system based on the Intel 8080 that is designed for small retailers, doctors offices and the construction industry is available from ComputerCo., Inc.

The system includes the CPU with 32K of random-access memory, 179.2K of storage on floppy disk drives, a CRT input terminal and a 132-column matrix printer. The system can be upgraded in storage, memory size and printer speed, the company noted.

The unit costs "less than $12,000" excluding shipping and is available in 60 to 90 days from the firm at 5849 Dorchester Road, Charleston Heights, S.C. 29405.

Plessey Unwraps Signal Processor

SAN FRANCISCO — The SPM/02/11 from Plessey Microsystems is a fast fourier transfer signal-processing peripheral designed for use with Digital Equipment Corp. PDP-11 minicomputers.

The SPM-02/11 add-on package is configured as a peripheral to a host PDP-11 mainframe with all data transfers taking place under direct memory access (DMA). Interface to the 'unibus' is via a standard DMA interface card.

Software control of the module is achieved through the use of programmed requests when programming in Macro-11 Assembler language or system subroutine library calls when programming in Fortran IV, the vendor said.

The SPM-02/11 may be used with any of the PDP-11 range of computers using RSX-111 or RT-11 operating system.

The complete system, including software, is $9,200 from 1641 Kaiser Ave., Irving, Calif. 92714.

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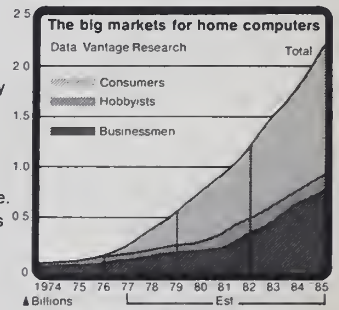

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Mini-Based System Aids Architectural Planning

By Mary O. Stewart
Special to CW

BOSTON — Minicomputer-aided design is helping Clifford Douglas Stewart Associates here provide a range of services aimed at allowing architects to design what is needed where and when it is needed.

The architectural/planning concern offers the use of its computer-aided design center to architects from other firms and also uses the system for its own work.

The company developed these services in order to help solve three problems in the construction industry: the great demand for construction, the shortage of experienced design specialists and the reduced time span within which to provide these services.

Range of Services

The services provided cover a broad range. The system can help survey and map large areas to find appropriate building sites. The computerized data base contains information on the various characteristics of each area's natural resources. Selected criteria governing the potential use of land or selection of alternate sites can be displayed graphically.

The user selects the limits of interest within the appropriate criteria and a multitone map is plotted in up to three colors.

It can be used to analyze the socioeconomic forces in an urban environment. A variety of data is entered into memory and used selectively to generate shaded maps showing factors important to the planning effort. From basic plots, additional overlays can be requested of the computer until the final maps illustrate new considerations.

Details Space Needs

The system develops detailed listings of the space needs and planning requirements for educational, health or industrial facilities. At the same time, lists of equipment, staffing profiles and construction estimates can be compiled. For every space type in the building, a listing is maintained of the equipment and furnishings normally found in that space. This program delineates the description (including manufacturers); the required clearance dimensions, and the electrical, plumbing, gases and exhaust requirements.

For each piece of equipment listed, there is a scaled drawing that can be called from memory, displayed on the CRT and plotted in design or working drawing form on the plotter. Additional pieces can be added and simulations of movement and flow can be created dynamically and recorded.

Program Assembly

The space program for a project can be assembled from the basic library in minutes, presenting the required area and the probable construction cost, escalated to bid date, for each major component of the program separated by phase of construction. Each edit of the proposed basic spaces illustrates the new relative cost, efficiency and staffing requirements.

The most efficient layout of space can be discerned from computer-aided matrix analysis. The computerized approach eliminates the need for broad assumptions and guesswork in the site planning and interior layout of complex building. From a numerical code matrix representing the ideal relationship between each of the functions, the system generates a diagram of the ideal physical relationships. It then transforms the "bubbles" of the ideal diagram into exact scale rectangles of the correct dimension which the designer will arrange interactively on the CRT to form a proposed layout.

Independent PDP-15s

The systems behind these services are two Digital Equipment Corp. PDP-15s. The two minis stand side by side, but are completely independent. Each has 32K of core, disk cartridge drives, and an interactive graphics workstation consisting of two CRTs, one with electronic tablet and spark pen, and a Versatec dot printer/plotter.

One system has a California Computer Products, Inc. (Calcomp) 36" three-pen plotter, for producing final ink drawings. Backup is done on magnetic tape and data can be transferred between these and other similar systems on Dectape.

DEC Maintenance

One of the two PDPs was purchased new from DEC. The other was purchased used. DEC maintains them both, including the Versatec and Calcomp plotters. Early in the development of the system, peripherals were purchased from and maintained by different manufacturers. This approach resulted in a lot of fingerpointing and time-wasting, trying to determine which piece of equipment had failed, and therefore which manufacturer was responsible for correcting the problem. Maintenance of the entire system by DEC resolved the problem of determination of responsibility.

The systems are used mainly by architects, not by programmers or other computer-oriented personnel. They are not in a very controlled environment, cigarettes and coffee are not forbidden. While this does occasionally cause a problem, it also results in greater acceptance of three- or four-hour-long work sessions at the workstation.

Stewart is computer systems manager at Clifford Douglas Stewart Associates in Boston.

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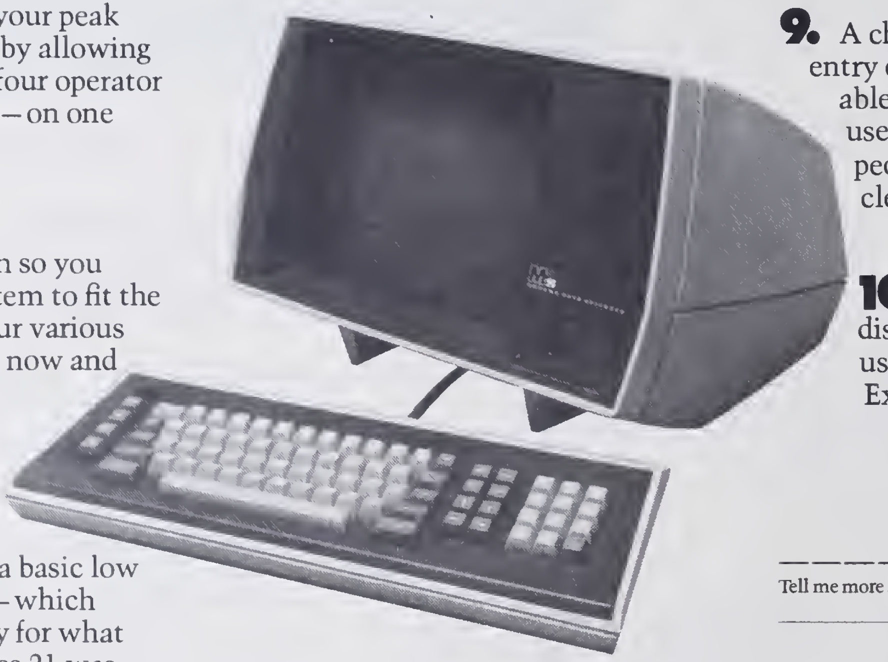

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Replaces Isolated I/O

Memory-Mapped I/O Found Flexible

SAN FRANCISCO — It has been proven over the years that memory-mapped I/O is an extremely flexible I/O-handling architecture, according to a paper presented at a recent conference.

The paper, "Addressing Peripherals as Memory Locations," by Michael Gooze of Motorola, Inc., looked at the approach of memory-mapping I/O handling in microprocessor-based systems.

"Addressing peripherals as memory locations, now commonly referred to as memory-mapped I/O, is a relatively new I/O-handling architecture, first made popular by the PDP-11 line of Digital Equipment Corp. minicomputers," Gooze said.

Until the advent of memory-mapped I/O, the common technique in use was isolated I/O. This technique is still used in many computer systems because it is simple, he said. "Utilizing this approach, I/O devices communicate directly and only with the accumulator of the MPU. In general, the total I/O instruction set consists of an IN instruction and an OUT instruction," he noted.

8080 Cited

Often, the number of addressable I/O locations is significantly less than the total memory address space. The 8080, which he cited as an example, has 65K of memory address space but has only 256 I/O addresses and additional I/O locations require external hardware.

The memory-mapped I/O approach is an I/O-handling technique in which peripheral I/O devices are treated the same as memory locations, he said. All peripheral devices "hang" on the same address and data bus as do memory devices. Each device is given a unique address in the memory field. Access to a particular device is then obtained by addressing the exact location (address) in the address field which has been assigned to that individual device, he said.

By treating I/O devices as memory, optimum flexibility is obtained, and the technique allows all memory-oriented instructions to be utilized for peripheral handling.

In many cases, system debugging is made easier with memory-mapped I/O because of the ease and flexibility with which peripheral devices can be directly accessed, he added.

Four Extended Basic Packages Released

MARQUETTE, Mich. — The Software Store here has introduced four Mits Disk Extended Basic compatible software packages.

The Disk Sort package supports fixed or variable-length sequential files of any size and will sort or merge on any number of keys anywhere in the record, according to the firm. It has an interactive generator that allows the user to define a customized sort/merge program for each task.

Multiple sort/merge tasks can run unattended with user-defined job-stream links, the spokesman said, giving the example of being able to sort 12 files, merge them with another sorted file and link to the report program.

Memory and disk space are managed by the system to minimize processing time, the spokesman claimed.

Interacts With Operator

The firm's Universal Data Entry (UDE) system interacts with the operator to generate custom key-to-disk modules, he noted, adding that user-defined displays can provide "fill-in-the-blanks" simplicity for data entry operations.

Validation procedures such as check digits, value tables, range tests, batch totals and record counts improve data quality, he claimed. Selectable field duplicate or increment is available to eliminate repetitive entries, and the UDE supports both fixed and variable-length disk files.

The Disk Fix system recovers data and program files that were lost as a result of DISK I/O ERROR and FILE LINK ERROR, the firm said. Disk Fix provides an automatic mode for rebuilding files and the file directory. In manual mode, the user can examine or rewrite any sector of an unmounted diskette, the spokesman said, noting that the selected sector is displayed in both decimal and controlled Ascii with all system overhead labeled.

Disk Fix provides the alternative to reentering entire programs or data files, he claimed.

The firm's Word Map system adds word indexing to its Mini Word Processing (MWP) system. Text and name/address fields created by MWP can be cross referenced, the firm claimed.

Word Map is used for indexing text, detecting misspelled and over-used words, deleting duplicate name/address entries and cross referencing Basic or Assembly language programs, it was reported.

Word Map allows the user to choose the input file, minimum word length to index and the output device. It is unnecesary for the user to specify a list of words to occur as the system limits any word to 120 indexed occurrences, the spokesman said.

Disk Sort and Universal Data Entry cost $195 each, while Disk Fix and Word Map sell for $95. All software comes with a users manual. The Software Store is at 706 Chippewa Square, Marquette, Mich. 49855.

Want to Swap?

TULSA, Okla. — A user of the RCA Model CDP1802 microcomputer is planning to publish a listing of available software for the unit.

Persons desiring either to give away or to sell software for the CDP1802 are asked to provide Ross Wirth with a listing for review. The booklet will provide a description of the software and cost information with a reference number corresponding to a number on an order coupon, Wirth said.

The booklet will sell for $1 per copy and advance orders, software listings and other questions should be directed to Wirth at 1636 S. 108 East Ave., Tulsa, Okla. 74128.

Book Provides Tips On Micro Makeup

NEW YORK — Coverage of the various types, languages, design software and applications of microcomputers is provided in Microprocessors and Small Digital Computer Systems for Engineers and Scientists, recently published by McGraw-Hill Book Co.

In his book, Granino A. Korn provides a survey and comparison of available microprocessor systems and microprocessor-based minicomputers. He also covers the different I/O interfaces and interrupt circuits, including how they affect programming.

In addition, the book provides tips on Assembly language and the use of macro for writing "homemade" languages for special applications; a discussion of software systems and microcomputer prototype development systems; and reference guides to Extended Basic and PL/M microcomputer languages.

The book sells for $24.50 from the publisher at 1221 Avenue of the Americas, New York, N.Y. 10020.

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'Bugbooks' Offer Lessons On 8080A Programming

DERBY, Conn. — A two-volume course that integrates introductory experiments in digital electronics with lessons in programming and interfacing an 8080A-based microcomputer is available from E&L Instruments, Inc.

Bugbook V and *Bugbook VI* by D.G. Larsen, P.R. Rony and J.A. Titus are lab experiment-oriented texts that together comprise 23 instructional chapters or units totaling 870 pages.

The paperback books in the *Bugbook* series are intended for study and guidance in the performance of hands-on experiments with the aid of a microcomputer, breadboarding kits and readily available components, according to a spokesman.

Organized for Teaching

The course material is organized for teaching microcomputer programming and the interfacing of a microcomputer to external digital devices for practical applications. The hobbyist is expected to perform the suggested experiments to obtain the most benefit from the course material, the spokesman said.

Integrated circuits and the microprocessor are treated as functional black boxes with specific electrical characteristics; semiconductor physics and mathematical analysis are omitted. Laboratory experiment and text review questions and answers are included to test reader understanding of the subjects covered, he added.

Bugbook V with 15 units in 493 pages covers the basics of 8080A microcomputer programming and instructions as well as digital codes, registers, logic gates and truth tables. An introduction to breadboarding is followed by instructional units and experiments covering 7400 series TTL integrated circuit chips including flip-flops and latches, decoders, counters, digital signal gates and mulivibrators, he said.

Bugbook VI has eight units in 490 pages; it integrates the digital concepts discussed in *Bugbook V* into a treatment of 8080A microcomputer interfacing and programming.

Detailed instructions and related laboratory experiments cover select pulses; the 8080A instruction set; three-state busing techniques; and introductions to accumulator and memory-mapped input/output techniques.

Other Topics

Other topics in *Bugbook VI* include advanced input/ouput concepts and interrupt servicing.

Complete appendixes for both volumes at the back of *Bugbook VI* include references, definitions and descriptions of available breadboarding accessories and microcomputer recommended for use in the experiments.

Bugbook V and *Bugbook VI* are priced at $9.50 each, from E&L at 61 First St., Derby, Conn. 06418.

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This special classified section in solid (non-display) format is designed for people who are working with or interested in microcomputing. Through it, you can buy, sell or swap equipment software or services; contact people with similar interests; start clubs; disseminate information; look for game partners; or send messages to other individuals. As the number of ads increases, this section becomes more useful; so we've tried to make ad placement as simple and inexpensive as possible. Details are as follows:

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In Brief Backing Calcomp Ruling

IBM Says Pricing Not Monopoly Factor. . .

By Molly Upton
CW Staff

SAN FRANCISCO — IBM's methods of introducing new products and lowering prices are indicative of the competitive nature of the DP industry, not of any exercise of monopolistic powers, according to an IBM brief recently filed with the Ninth Circuit Court of Appeals here.

The document was filed in response to an appeal by California Computer Products, Inc. asking that the directed verdict which ended its antitrust suit against IBM be overturned and that a new trial be granted [CW, Sept. 5].

"This case exists because IBM has reacted to [the challenges of the marketplace] with better products and lower prices of its own — as it was forced to do by its accelerating loss of business. That is competition, not monopoly," the IBM brief stated.

No Evidence

Calcomp failed to furnish any evidence from which a jury could conclude that Calcomp was damaged by any act of IBM forbidden by the antitrust laws, IBM contended.

Furthermore, Calcomp failed to prove that a relevant market existed and that IBM has monopoly power, IBM said. It also failed to make a prima facie showing that it suffered injury.

Even if Calcomp had sustained such an injury, there was insufficient evidence to provide a factual basis for a reasonable computation of damages, the brief continued.

The IBM response dismissed the amicus curiae, or "friend of the court," briefs of the Justice Department, Memorex Corp. and Transamerica Computer Corp. The latter two did not address the record in this case and are irrelevant, while there is no necessity to remand the case to the district court as suggested by the Justice brief, IBM said.

Much of the IBM brief is devoted to the issue of what constitutes illegal pricing under antitrust laws, the same issue addressed by Memorex and Transamerica. IBM maintained its price reductions were substantially profitable and thus not "forbidden by the antitrust laws."

"Even if Calcomp is correct that profitable price competition may be forbidden by the antitrust laws under unusual circumstances, there is no evidence of such circumstances in this case," the IBM brief asserted.

"The rule that Calcomp seeks amounts to a rule that prohibits an established or dominant firm from making any reduction from prices once set," IBM continued.

Furthermore, "IBM's profitable price reductions could not support a finding that IBM attempted to monopolize any market," IBM stated.

In the section devoted to the thesis that Calcomp failed to prove IBM has monopoly power, IBM said that it has reduced, not raised prices, that competitors are "strong and growing," that new competitors have entered and succeeded and that there is direct proof of competition.

"The fact that defendant's market share is declining in the face of continued entry and growth of its competitors is inconsistent with the possession of monopoly power," the brief pointed out.

. . . But Others Support Calcomp: Price Cuts Don't Void Monopoly

SAN FRANCISCO — Like the three musketeers, three firms with antitrust suits against IBM share a binding interest in each other's welfare — in the courts at least.

Both Transamerica Computer Corp. (TCC) and Memorex Corp. have filed amicus curiae, or "friend of the court," briefs supporting California Computer Products, Inc.'s appeal to the Ninth Circuit which seeks to overturn the directed virdict issued by Judge Ray McNichols in the Calcomp vs. IBM antitrust case [CW, Sept. 5] The Justice Department also filed a similar brief.

The suits filed by TCC, Memorex and Calcomp were all consolidated for pretrial discovery. TCC and Memorex therefore view with concern the fate of the antitrust trial of fellow musketeer Calcomp.

In their briefs, they expressed fears that if the logic espoused by the granting of the directed verdict prevails, Section 2 of the Sherman Antitrust Act will have been seriously eroded.

Although both indicated they intend to prove in court that IBM priced some of its products below cost, they pointed out that a large firm does not have to price its products below cost in order to be considered a monopoly engaging in anticompetitive practices.

Both briefs labeled as diversionary the IBM concept that to be anticompetitive one must price its products below cost. They contended IBM engaged in price balancing, lowering prices on some products while raising them on others, so the net result was that consumers did not receive any benefits.

TCC said these reductions were "in no sense procompetitive. It is not and should not be the law that a monopolist can exclude competition by pricing actions and then be excused simply by asserting that it believed its products would return reasonable" profits, the TCC brief argued.

In fact, IBM's defensive tactic of pointing out that it did not price any products below cost is "dangerous where, as here, the products at issue are leased. The evidence consists of projections and the monopolist is the source of those projections," TCC continued.

"IBM's position . . . that a monopolist can lawfully do what any other firm could do has been rejected by the law for over 30 years," TCC stated.

"Furthermore, only a monopolist could do what IBM has done and only a monopolist with the purpose to maintain its monopoly by means other than innate superiority would do it," TCC said.

"It has never been the law under Section 2 that a monopolist can undertake anticompetitive conduct with impunity so long as its products show a profit by some economic standard," TCC said.

"Such a test must never be the law if Section 2 is to be anything more than an exhortation, especially in a lease industry in which a monopolist can, with facility, represent products as profitable simply by projecting them to be profitable," the brief added.

The Memorex brief focused on the criteria under Section 2 for judging the legality of price cuts by a firm possessing monopoly power.

"A failure by this court to reverse the directed verdict may be construed as placing price cuts by a dominant firm beyond the scrutiny of the trier of fact," Memorex said.

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Services Mart to Rise Annual 18%, Adapso Told

By Molly Upton
CW Staff

NEW YORK — Led by a forecasted annual growth rate of over 22% in the software sector, computer services industry revenues are expected to grow at 18% compounded annually through 1981, according to a study prepared for the Association of Data Processing Organizaitons (Adapso) by the International Data Corp. (IDC).

Revenues in 1981 should total $12 billion compared with $5.3 billion in 1976, the report said.

The 18% projection exceeds the 13% forecast for the computer manufacturing industry during the same period.

During 1976, the services industry obtained a 17% increase in revenues over those of 1975, whereas in 1976 the rate was 16%, the report noted.

Sales of software packages should have continued strong growth, with a 30% increase in 1977 followed by 30%, 28%, 25% and 22% in the following years, IDC indicated.

In 1976, software packages accounted for 10% of the industry's revenues, of $550 million. This figure should grow to 15% by 1981, to about $1.85 billion, according to the report.

Processing services will retain the lion's share of the industry's revenues, ranging from 68% in 1976 to 67% in 1981 and experiencing annual growth no lower than 16%, the report stated.

The staff support services sector will decline from 13% of the industry revenues in 1976 to 9% in 1981, while facilities management will maintain a constant 9% of the industry revenues, IDC said.

In 1976, companies with revenues of over $10 million, which represented only 2.5% of the total number of services firms, accounted for over 51% of the revenues of the entire industry, or $3.79 billion, IDC indicated.

However, 2,280 firms with revenues under $2 million divided up $1.4 billion or 25% of the revenues.

Medium-size firms between $2 million and $10 million accounted for 23%, or $1.2 billion in revenues, the study said.

Gross Profits

Looking at gross profits as a percentage of revenues, IDC found medium-size software firms led with 15%, followed by large processing firms with 13% and small processing firms with 12%.

Processing firms derived 53% of their revenues from specialty products, while software support types of firms obtained 54% of their revenues from packaged software, of which 31% came from system packages and 23% from application packages. Processing firms are those which receive the majority of their revenues from processing services; the software staff support and multiproduct companies constitute the software category for this particular breakdown.

The study, based on responses from 107 firms, cited as factors influencing the strong growth:

- The economic recovery.
- Vendor's recognition of the potential market for minicomputer-related products.
- New products, both those which improve the price/performance ratios and those which expand the potential customer base.

CI Notes

Proceedings Ending In Viatron Bankruptcy

BOSTON — Bankruptcy proceedings are nearly complete for Viatron Computer Systems Corp., which went out of business three years ago.

The plan pursuant to Chapter 10 has been approved by the U.S. District Court, District of Massachusetts, here. A hearing on the confirmation on the plan will be held Oct. 27 at the court.

Since cash is sparse, no creditors or stockholders can be paid and none are affected by the plan, the court indicated.

Design 100 Hires Sorbus To Support Gen-Com Units

ESCONDIDO, Calif. — Design 100 Corp. said it has retained Sorbus, Inc. to help it support the installed base of 2,500 printer terminals originally sold by Gen-Com Systems, Inc.

Design 100 jointly developed Gen-Com's Uniterm communications terminal and manufactured about 1,000 of the units, the firm said.

Following Gen-Com Systems' entrance into bankruptcy proceedings, Design 100 signed the support agreement with Sorbus, which also enables Sorbus to negotiate with Design 100 distributors to maintain its Cleantype family of products, the firm said.

Design 100 said it views the base as potential upgrades to its Cleantype line.

Graham, Carlisle Ink Agreement to Merge

FORT WORTH, Texas — Graham Magnetics, Inc. has signed a preliminary agreement to merge into a wholly owned subsidiary of Carlisle Corp., a diversified manufacturer.

Under the agreement, subject to approval by Graham shareholders and compliance with certain conditions, Graham holders would receive $18 in cash for each Graham share.

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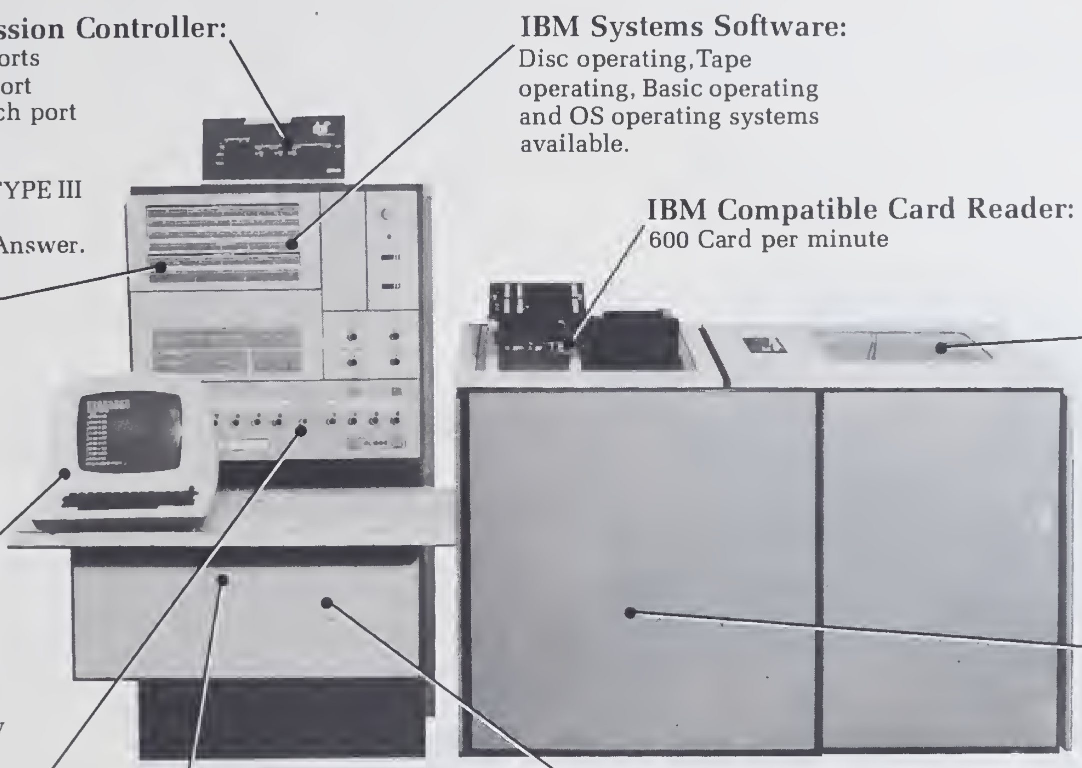

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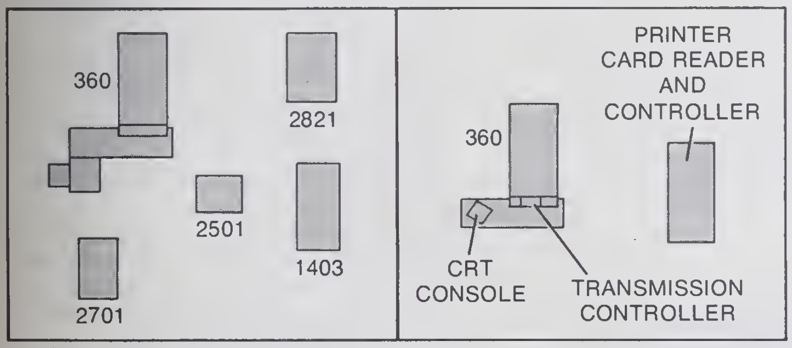

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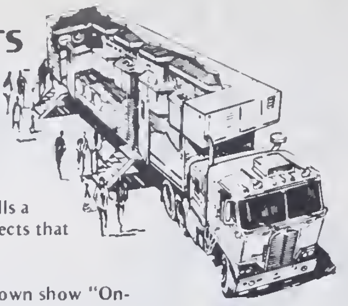

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DG Seeking Trade Relief From Brazil's Import Bars

WESTBORO, Mass. — Data General Corp. has asked the President's special representative for trade negotiations to attempt to mitigate the quandary of U.S. minicomputer makers concerning Brazilian importation restrictions.

Currently the Brazilian government imposes a quota on the number of minis that can be imported and also levies a sizeable tariff on them.

It is seeking to foster its own native industry and requires those U.S. minicomputer firms seeking a manufacturing license to agree to the sale of hardware and software technology, a DG spokesman said.

DG suggested four options for the negotiator to consider.

According to a briefing paper submitted by DG to a government representative last May, the U.S. could consider a "bilateral request that Brazil eliminate tariff and non-tarrif barriers on U.S. minicomputers in exchange for shelving retaliatory U.S. barriers on Brazilian imports into the U.S."

Another tactic would be to initiate a bilateral request that "Brazil eliminate technology transfer requirements for granting manufacturing license to U.S. firms in exchange for granting U.S. approval for such manufactruing licenses."

Other techniques would be to establish "U.S. regulations prohibiting ownership transfer of minicomputer technology (hardware and software) to any wholly owned foreign firm, but permitting manufacturing licenses."

The fourth option would be to establish "U.S. regulations prohibiting foreign government agreements with U.S. firms providing them exclusive exemption from import quotas or licenses," according to the DG memo.

Preference for Export

The memo outlined the firm's preference for expanding international business through export of its U.S. designed and manufactured products.

"There are no basic cost advantages to foreign manufacture, either direct or through license, of this type of high-technology product," DG said.

In fact, "there are likely to be less advantages in the future to foreign manufacture [because of] the greater foreign inflation rates and further miniaturization of the basic product," the minimaker stated.

DG has granted manufacturing licenses only as an "undesirable alternative to export in order to meet foreign government requirements for entry into foreign markets," the memo continued.

Because of rapid technology changes, manufacturing licenses restrict access to future products and assure "eventual obsolescence of the licensee's processes."

However, the Brazilian government wants not only a manufacturing license but also the transfer of technology. DG has received similar requests from less developed countries and the Soviet Union.

The transfer of minicomputer technology is a "cheap and effective method" for foreign nations to deal with rising foreign national inflation rates and enlarging trade deficits, DG observed.

Since the export of U.S. minicomputers is rarely restricted on technological grounds, minis are well suited to "such exploitation," the DG memo observed.

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For more information contact George I. Middleton at U.S. Department of Commerce, DIBA/BIC/OIM, Room 4126, Washington, D.C. 20230.

IBM, India Negotiating Firm's Future There

ARMONK, N.Y. — IBM and the Indian government have not yet reached agreement on a plan that will enable IBM India to remain in the country.

The nub of the problem appears to be the government's Foreign Exchange Regulation Act (Fera) that allows 100% foreign-owned firms to remain in the country only if their sole operation is manufacturing devoted exclusively to export.

A Fera representative told IBM India it could continue to do business in India only if it were to dilute its equity in marketing and service [maintenance] business to 40%, an IBM spokesman said.

IBM does not wish to dilute ownership of its manufacturing plant in Bombay, nor does it wish its operations restricted to exports, a spokesman stated. It locates plants only in countries where it markets its products, he continued.

The firm has received verbal indication that Fera has rejected its four-pronged proposal, which included spinning off and diluting ownership of its service bureau operations, he added.

Under the April 1976 proposal, IBM would agree to:

- Reorganize IBM India's computer service bureau to provide 60% Indian ownership.
- Grant nonexclusive licenses to IBM's patents.
- Establish joint projects to help further extend technological developments in India such as a jointly run scientific center with an IBM System 370 and an IBM-developed electronic testing laboratory for government use.
- Manufacture in India exclusively for export with an annual export goal of $10 million. The export-only manufacturing plant in Bombay would be part of a fully owned company which would continue IBM's traditional marketing and service operations in India, IBM said.

As part of its "traditional marketing and service operations," IBM would want to be able to import and sell 370s within the country, the spokesman said.

Under the proposal, IBM's Bombay plant, which now produces unit record equipment and parts for other plants and thus serves the Indian market, would be geared exclusively to the export market, an IBM spokesman said.

IBM is awaiting "receipt of the official letter of notification of the government's decision and we are still hopeful the government will accept our proposal and not force us to leave India," the spokesman said.

IBM India employs 800 Indians, down from 1,200, and has been in the country 25 years, the spokesman continued.

Since the opening of the Bombay plant in 1964, exports have created a favorable balance of trade for IBM India, the spokesman said.

Also, as recently as two years ago, the exports from IBM's plant accounted for about 50% of India's electronic exports, he added.

As a result of import and licensing restrictions, an inability to obtain government approval of customer orders for System 370 and its uncertainty about the future, last year IBM offered, and 300 employees accepted, financial assistance in pursuing other careers, the spokesman said.

Acquisitions

Automatic Data Processing, Inc. has acquired **Association Service Corp.** and has also contracted to acquire **Eastern Data Processing, Inc.**

Computer Specialists Corp.'s Pepco Division has purchased the inventory and product rights to the **Millifile Microfiche Camera** and accessories from **Eurotec International.**

Lear Siegler, Inc. has acquired the assets of **Hydra Corp.**, a matrix printer firm.

On-Line Systems, Inc. has agreed in principle to acquire the stock of **Atkins Computing Services Ltd.**, a time-sharing and batch bureau headquartered in England, and a related small time-sharing company headquartered in the Hague.

NLT Computer Services Corp. has signed an agreement to purchase the Washington, D.C.; Memphis; Beloit, Wis.; Chicago and Minneapolis offices of **Analysis and Programming Corp.**

Mohawk Data Sciences has been holding preliminary discussions toward the acquisition of **Keuffel & Esser Co.**

Anacomp, Inc. has agreed in principal to acquire the outstanding common stock of **Computer Management, Inc.**

Carlisle Corp. has agreed in principle to acquire **Graham Magnetics, Inc.** All of the outstanding common stock of Graham Magnetics will be sold for a net cash purchase price of $18 a share.

Trans Union Corp. has acquired **Rochester Instrument Systems** (RIS). Trans Union will exchange .45 share of its common stock for each share of RIS common stock.

The **Microfax Division of Universal Information Systems, Inc.** has acquired the assets of **McDonald Micradata Services, Inc.**

EG&G, Inc. has acquired **Quality Measurement Systems, Inc.** through an exchange of common stock.

Rapidata, Inc. has acquired the time-sharing services accounts of the **Acts Computing Division** of Lear Siegler, Inc.

We knew it from the beginning. And, so did our customers. We were convinced from the start that static RAM technology was the way to go on our 370 add-on memories. Static is faster. More reliable. And, totally compatible with IBM.

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Pertec to Set Profit Records: Poppa

LOS ANGELES — Pertec Computer Corp. will set records in revenues and profits this year and a sales and earnings growth rate of more than 20% annually is an achievable goal, the firm's chairman predicted recently.

Ryal R. Poppa, who also serves as president and chief executive officer, told stockholders at the annual meeting that Pertec is in a good position to take advantage of the expected growth in both the microcomputer and distributed processing areas.

The rising cost of everything but computing power is going to make computer use progressively more attractive in the late 1970s and early 1980s, Poppa noted, predicting that the small business computer user of the future will be part of a market that didn't exist three years ago, but that will account for $100 million in revenues by the end of this decade.

"While some people assume that the computer market is mature because it has been around for 20 years-plus, nothing could be further from the truth," Poppa told shareholders.

"There are millions of small businesses, homes, institutions and departments within large companies that can now afford computers because the cost is coming down so fast," he added.

Pertec, he indicated, is well placed to serve these markets because it sells peripherals to mini manufacturers, markets key-to-disk systems to end users through its CMC division, and sells directly to hobbyists and small businesses through its Altair and ICOM lines of microprocessors and micro peripherals.

Poppa noted that in fiscal 1977 Pertec had revenues of $94.5 million, while in the previous year — which was shortened to nine months because of the CMC acquisition the revenues had been only $36.7 million.

ADP Earnings Up 24%

CLIFTON, N.J. — Automatic Data Processing, Inc.'s earnings in the fourth fiscal quarter ended June 30 rose about 24%, to $6.7 million or 45 cents a share, from $5.4 million or 37 cents a share a year ago.

Revenues rose some 17% to $64.6 million from $55.3 million in the year-ago period.

Earnings for the full fiscal year also climbed 24% to $23.3 million or $1.58 a share compared with $18.7 million or $1.28 a share in 1976.

Revenues rose 23% to $245 million from $199.2 million in fiscal 1976.

ADP's results are about in line with President Frank R. Lautenberg's forecast last February that fiscal 1977's earnings would rise about 25% on a somewhat lesser increase in revenue.

During fiscal 1977, ADP acquired CPI Group, Inc., First Data Corp. and several smaller service operations at prices totaling $2.3 million in cash and 570,000 shares of stock valued at about $16 million. These concerns contributed about $15 million to the firm's 1977 revenue, according to Lautenberg.

Foreign operations have grown substantially since ADP first moved outside the U.S. about two years ago, he added. Foreign operations in Europe, Canada and Brazil had operating profits, before corporate expenses and taxes, of $4.1 million on revenue of $20.1 million in fiscal 1977.

Incoterm Reports Increase In Revenues and Earnings

WELLESLEY HILLS, Mass. — Revenues and earnings both increased at Incoterm Corp. here during the second quarter and first half of this year.

The firm reported revenues of $11.5 million and earnings of $628,000 (31 cents per share) during the second quarter ended Aug. 27. In 1976, the firm reported income of $8.9 million and a net of $556,000 (28 cents per share) in the comparable quarter.

At the same time, the six-month figures totaled $23 million in revenues and $1.2 million in earnings (62 cents per share) compared with last year's $17.1 million and $912,000 (.46 per share).

Backlog at the end of the period amounted to $24.5 million, down from the company record of $27.5 million set at the end of the second quarter of 1976.

Adds Up

HAUPPAUGE, N.Y. — Applied Digital Data Systems, Inc. here reported records for both earnings and revenues during the third quarter ended Aug. 31 this year.

And the record quarter helped boost the nine-months results about 50% over those reported for the same period in 1976.

In the quarter, revenues reached $9.4 million compared with the year-ago $6.1 million, while earnings went to $1.6 million from $1.2 million. Since the stock was increased dramatically during the same period, earnings per share dropped from 33 cents in 1976 to 29 cents in 1977.

In the first three quarters of the year, revenues topped $22.6 million and earnings reached $5.1 million. This compares with the first nine months of 1976 when revenues were $16.5 million and earnings were $3.8 million. Again, however, the earnings per share dropped — from 86 cents in 1976 to 75 cents in 1977.

Nickels & Dimes

Data Terminal's common stock has been approved for listing on the American Stock Exchange under the ticker symbol "DTS."

$$$

National Computer Systems has declared a quarterly dividend of five cents a share payable Sept. 27 to holders of record Sept. 2.

$$$

Honeywell has increased its quarterly dividend to 47-1/2 cents a share, up from 40 cents a share. The increased dividend is payable Sept. 12 to holders of record Aug. 26.

$$$

Wyly has revised its recapitalization plan in what it called the "last and best offer the company will make on a voluntary basis." Under the new plan, Wyly will declare a reverse one-for-four split of its 8.3 million common shares instead of the one-for-two previously proposed.

$$$

United Telecommunications has declared a quarterly dividend of 32 cents per common share and 37-1/2 cents per preferred share payable Sept. 30 to holders of record Aug. 25.

$$$

Computer Sciences has postponed its annual meeting of shareholders until Oct. 11. This second postponement will allow time to resolve legal issues in the agreement between CSC and the Jones Foundation.

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International News

Fujitsu Introduces Family of On-Line Networks

Fujitsu Ltd. has announced the Fujitsu Network Architecture (FNA), a logically structured and streamlined family of on-line computer networks. So far, Fujitsu has developed a number of on-line network systems, recognizing that standardization of computer-system components is essential to computer applications.

In recent years, computer usage has progressed from batch-processing to single-host networks and multiple-host networks.

The FNA expands the application and utilization of computer systems worldwide and meets demands for improved cost-performance and efficient, reliable service so important to the current fiercely competitive market, according to the firm.

Each network in the FNA is made up of a number of components — host computers, communications processors, subhosts, cluster controllers and compatible terminals — which are effectively combined under a single-line discipline.

Basically, data communication functions within the various components are separated from DP functions, enabling the system to take on many applications on the same line.

Protocols and operational sequences, however, are clearly defined for transmitting information units through the communication system.

The FNA lessens the work-load and demand on the host computer and minimizes the cost of extra lines and duplicated programming, Fujitsu said. The capability of existing systems is also expanded without much extra expense. Compatible computer networks such as the 230-5 Series, the 230-8 Series and the "M" Series can be hooked into the FNA through high-level data link control procedures, and other transmission control procedures are also available.

The FNA also provides access to leased lines, telephone switching systems, the Dendenkosha Data Exchange, the data highway (high-speed lines installed in plants) and optical communications, the firm said.

Based on recommended guidelines of the International Organization for Standardization (ISO) and the Comite Consultatif International Telegraphique et Telephonique (CCITT), the FNA is compatible with all networks in or out of Japan. Furthermore, it incorporates the "M" Series Network Architecture (MSNA) and is scheduled to align with the Data Communication Network Architecture (DCNA), Fujitsu stated.

Contracts

Computer Sciences Corp. has been awarded a $3.2 million support contract by the Energy Research and Development Administration to manage and operate computer and communications facilities at the agency's Nevada Operations Office.

Wango, Inc. has received a $2 million OEM contract from Cobra, S.A., Computadores e Sistemos Brasileiros for tape, disk and formatter products.

Tri-Data has received a $1.25 million OEM contract from Teradyne, Inc. to supply Cartri File Model H819, H809 and H820 magnetic tape systems for Teradyne's automatic test system.

Honeywell Information Systems has received a $1.6 million contract from Transportation Computer Systems, Inc. for a major upgrade of its mid-western DP network.

Logicon, Inc. has received two contracts totaling $1.1 million from the Air Force systems command to support the IBM Federal Systems Division in developing an adaptable surface interface terminal.

Computer Sciences Corp. has received a contract from Western Electric for nationwide time-sharing services.

General Instrument Corp.'s Rotating Memory Products has received a contract from National Micronetics, Inc. to support disk memory products.

System Maintenance and Services Ltd. (SMS) has received a contract from Digital Scientific Corp. to provide maintenance support for Digital Scientific customer installations throughout Europe.

University Computing Co. has licensed the use of its UCC/CIF (Central Information File) to the Federal Reserve Bank of San Francisco, Calif.

Microwave Semiconductor Corp. has been awarded an 18-month fixed-price contract by the International Telecommunications Satellite Organization for the development of a 4 GHz power transistor.

The Air Force Computer Acquisition Office has extended the existing contract with Burroughs Corp. for the B6700 system.

Canada Systems Group has been awarded a three-year DP services contract by Labatt Breweries of Canada Limited.

Datacrown Limited has received a three-year DP services contract from Agriculture Canada.

Digital Communications Corp. has been awarded a contract by Telenet Communications Corp. for 75 CP-9000 communications processors.

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Future Offices

HOLLYWOOD, Fla. — Four days of intense focus on the impact of computers, networks and other types of office automation on the working environment have been scheduled for Nov. 6-10 at the Diplomat Hotel here.

Sponsored by International Data Corp. (IDC), "Information Networks/Tomorrows Office" will cover topics ranging from word processing systems and electronic mail to voice/-data nets.

Speakers will include Howard Anderson, president of The Yankee Group; and Jack Fox, vice-president of Satellite Business Systrems.

Registration for the conference is $750. Details are available from IDC at 214 Third Ave., Waltham, Mass. 02154.

Boole & Babbage Ends First Decade

SUNNYVALE, Calif. — Boole & Babbage, Inc. (B&B) last month observed its 10th anniversary.

During the decade, the creator of performance evaluation software has made the transition from being dependent on two products, the Problem Program Evaluator and the Configuration Usage Evaluator, to having a range of 12 products in the areas of performance, computer cost accounting and operations management, with most recent emphasis on real-time performance analysis.

B&B is currently contemplating products that not only diagnose performance problems, but also automatically make the changes necessary to improve the system's performance, according to Bruce T. Coleman, president.

B&B now has a network of sales and service offices in 15 U.S. cities and 20 abroad, he said.

Tracing the evolution of B&B's products, Coleman said that as hardware and software technology increased in complexity, early evaluation and optimization techniques, which relied on direct observation of the physical computer environment, became increasingly difficult to use.

"By 1974, we had determined that B&B must move to automate the performance management process as much as possible, he said. Three changes in the industry made this apparent:

- The masking of how efficiently an individual job utilizes a system's resources because of multiprocessing.
- The shift from basic machine languages to those more closely resembling the English language.
- The arm's-length relationship between programmers and systems created by the use of terminals.

Recognizing these trends, B&B has moved ahead in computer performance, accounting and operations management, Coleman said. Its most recent response to industry needs is a line of Computer Management Facility (CMF) products which provide real-time performance analysis and management of the computer environment.

Few DP organizations ever consider developing their own performance monitors because they recognize the high costs of development, time involved and shortage of programming personnel, Coleman said.

Executive Corner

- Robert D. Baskerville has been named vice-president of the Infonet Division of Computer Sciences Europe, a subsidiary of Computer Sciences Corp.
- Howard G. Ulep has joined Computer Performance Associates, Inc. as senior vice-president.
- Eliott D. James has been promoted to the newly created post of vice-president and general manager of the Dallas operation of Harris Corp.'s Data Communications Division.
- Arnold M. Bloom has been appointed director of marketing at Bowe Systems.
- Dr. Theodore W. Stein has been elected chairman and Michael Ohannesian has been named president of Halcon Computer Technologies, Inc.
- David T. Morgenthaler Jr. and Edward F. Thompson have become vice-president for business planning and treasurer, respectively, of Amdahl Corp.
- C. Peter McCologh has been elected president and chief operating officer of Xerox Corp.
- Lawrence Seligman has been appointed director of small business systems and development and Francis A. Rowe has been named director of systems marketing programs for Data General Corp.
- Charles A. Dickinson has been named vice-president for manufacturing at Memorex Corp.
- Elliott Wassarman has been named Qume Corp.'s vice-president for marketing.
- Joe Grills has been elected to the newly created position of vice-president, finance, of the IBM World Trade Americas/Far East Corp.
- Dr. Herman Levin has been appointed vice-president for development at Tri-Data Corp.
- Gerald S. Newton has become vice-president for corporate manufacturing at Information Terminals Corp.
- Paul C. LaVoie has been promoted to senior vice-president of Sycor, Inc., which also has named John S. Cain and Paul T. Cochlan as vice-presidents.

"Towns you've probably never heard of" are now key locations in major data communication networks. And they're big in using terminals in many local applications.

That's why Trendata expanded its nation wide service facilities to cover places such as Victoria, Texas. Any data communications terminal manufacturer could have shipped a system there. We backed up a recent Victoria installation with a full training and service program.

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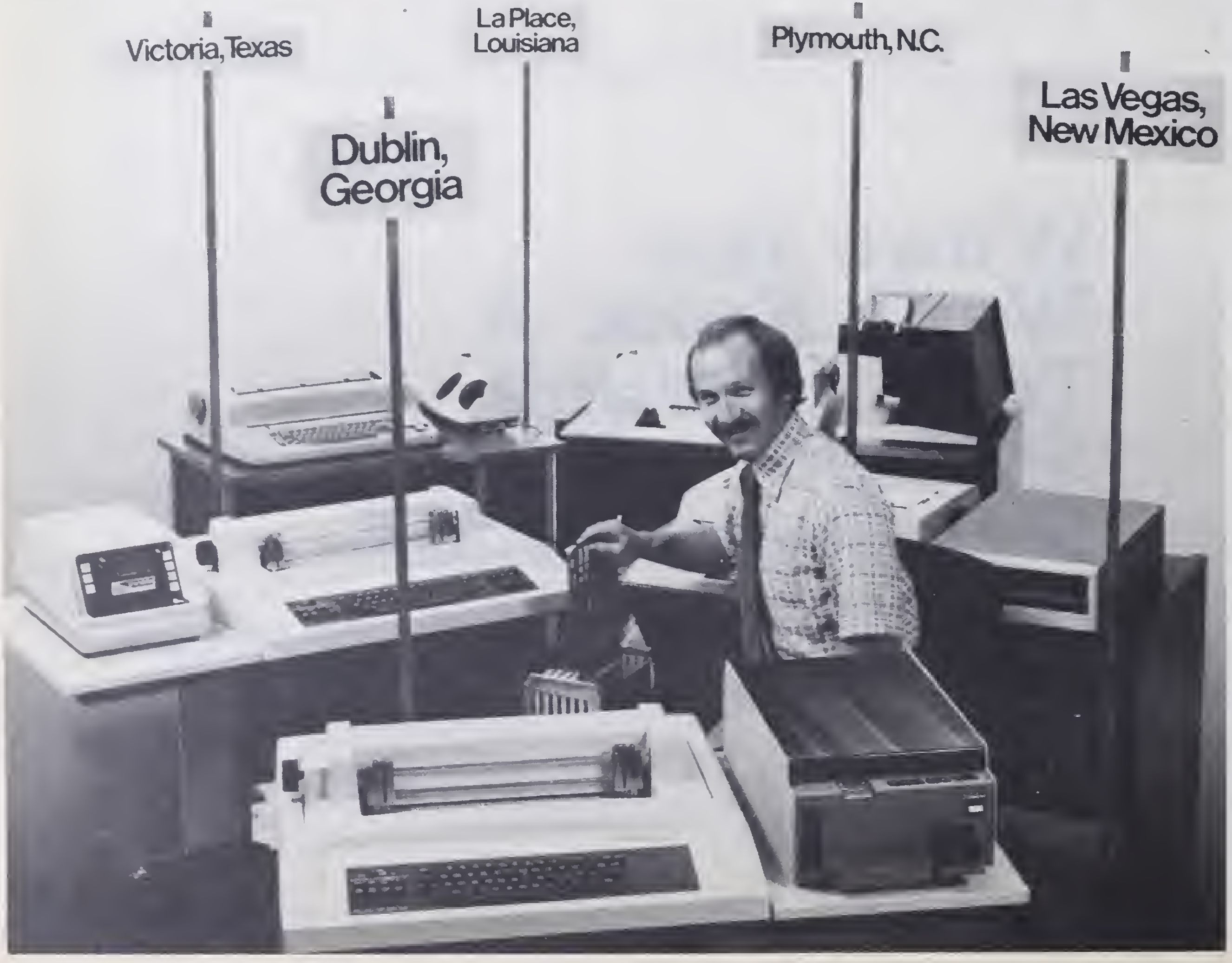

In Communications, Storage

Ampex Eyes Greater Growth, New Markets

REDWOOD CITY, Calif. — Ampex Corp. is in a strong position to play a major role in the two major growth areas of the future — visual communications and the storage and retrieval of information, Richard J. Elkus, chairman of the board, told shareowners recently.

"Ampex has established major growth positions in both of these areas and we have every reason to believe that our growth will continue," Elkus said, indicating that sound growth, not volume , is the corporation's aim.

Arthur H. Hausman, president, pointed out that Ampex is able to look to the future because of strong profitability in recent years that has been accompanied by a large reduction in the company's debt.

For fiscal 1977, the company reported a 77% increase in net earnings on a $29 million increase in sales and revenues to $287.4 million. That trend has continued into fiscal 1978: First quarter net earnings totalled $4.5 million, up sharply from the $1.8 million reported in the same period of 1977.

Hausman also pointed out that Ampex recently signed two new unsecured loan agreements. The agreements provide $30 million in long-term funds and $25 million in a prime rate-priced revolving credit agreement, which is not being used at present.

"We are now in the position to move beyond today's markets and into areas where what we have learned from over 30 years of technical achievement can be applied to the extension of present business and the development of new markets," he stated.

He noted that Ampex's recently formed magnetic tape joint venture in Mexico, Aurex, is successfully under way and that similar opportunities in other parts of the world are currently being investigated.

He pointed out that international sales are now a major strength of the corporation and added "Developing countries throughout the world present especially attractive marketing opportunities, as their needs for high-technology goods and services provided by Ampex grow more immediate."

Hausman reviewed Ampex's growth opportunities in the memory market, saying "we believe that the unique place for core memory products in the hierarchy of digital memory systems will continue in the future, but we also recognize the outstanding opportunities for complementary technologies in the marketplace: semiconductors, charge-coupled devices and magnetic bubble memory systems.

"Ampex has technical competence in these technologies and, looking toward the future, one should expect to see our memory products division providing families of products involving a number of these diverse technologies."

Orders & Installations

The Minnesota Educational Computing Consortium has ordered a Control Data Corp. Cyber 73 system to provide instructional computing for all levels of education in Minnesota.

Optico Industries, Inc., a manufacturer and retailer of eyeglasses and contact lenses, has ordered a Univac 90/30 system.

The Elyria, Ohio *Chronicle-Telegram* has ordered a T-410 publishing system from Tal-Star Computer Systems, Inc. for its news, classified/display and business DP.

McDonnell Douglas Corp. has installed the first two models of the Navy's standard airborne computer, the AN/AYK-14 from Control Data Corp. for the F-18 program.

The Oregon Bank has ordered $1.2 million worth of on-line BAS 2000 equipment from SCI Systems, Inc.

Worrell Newspapers, Inc. headquartered in Charlottesville, Va., has ordered a Honeywell Level 62 system.

Boise Cascade Corp. has ordered two Measurex Corp. energy control systems for its pulp and paper mill in International Falls, Minn.

The Chippewa Valley School District in Michigan has ordered a PDP-1134 system from Digital Equipment Corp. for its new vocational education center.

Crocker Bank of San Francisco has contracted to lease electronic proof and encoding equipment worth over $3 million from NCR Corp.

State Farm Mutual Automobile Insurance Co. has ordered computer output microfilm systems from Datagraphics, Inc., a General Dynamics subsidiary.

Stop & Shop Companies, Inc. has ordered a check-cashing and verification system from Value Exchange Corp.

Western Forge Corp., a manufacturer of hand tools for Sears, has ordered a Honeywell Level 64 system.

May Department Stores of St. Louis has ordered a Deposit Reporting System from National Data Corp.

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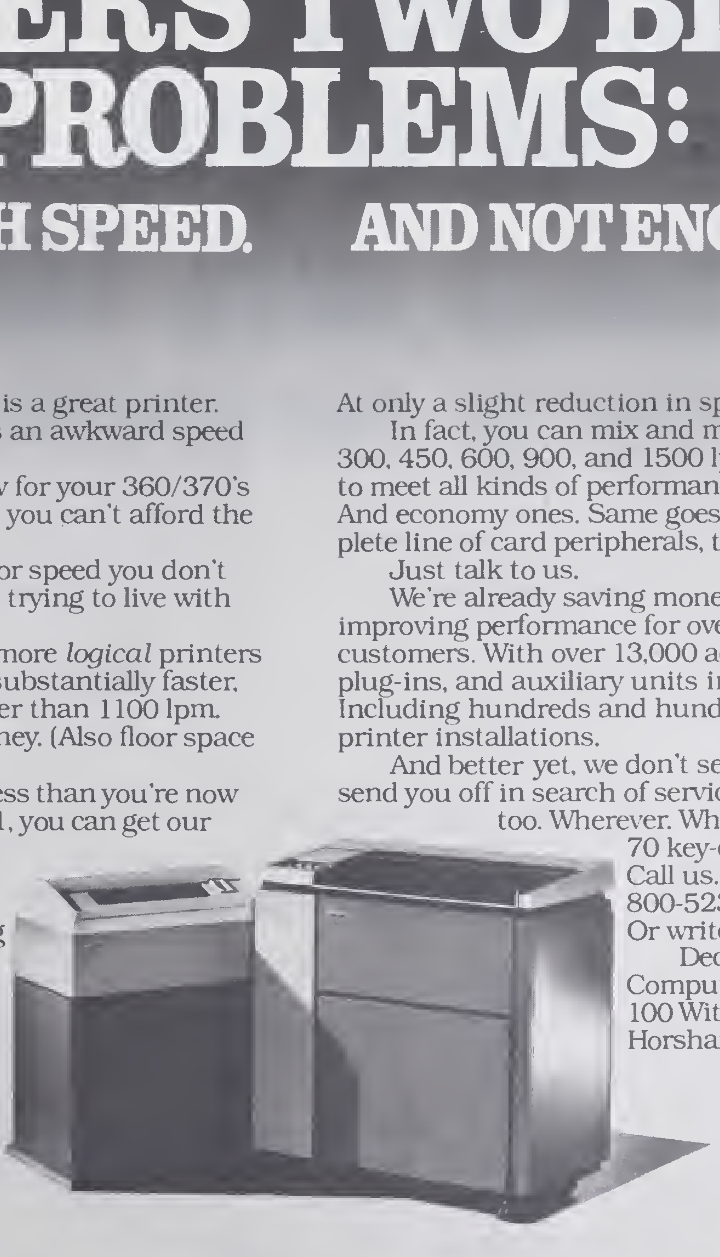

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BUSINESS/INDUSTRY
10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government-Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other ____________

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
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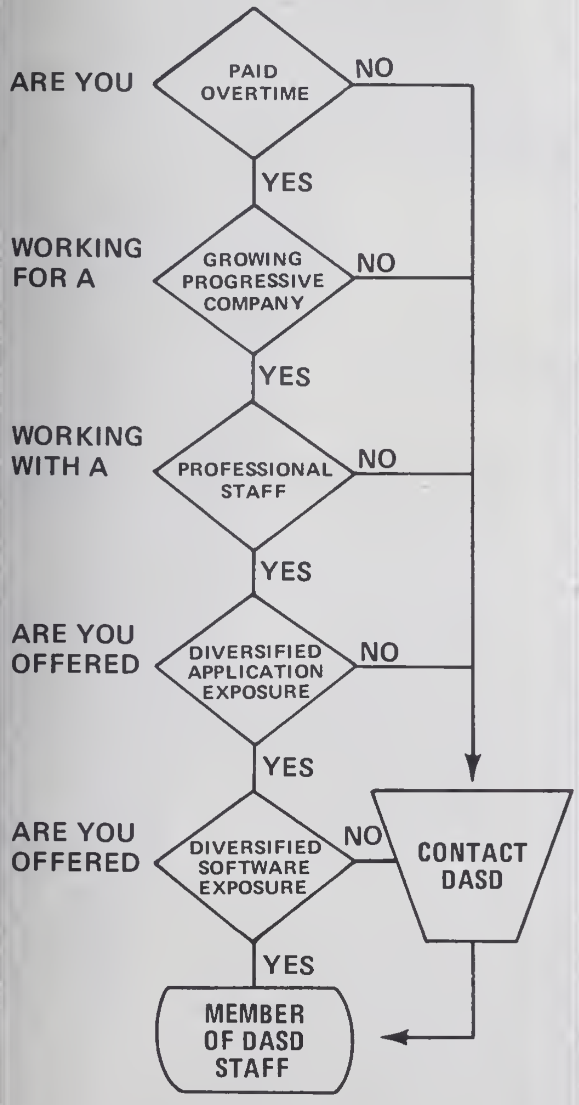

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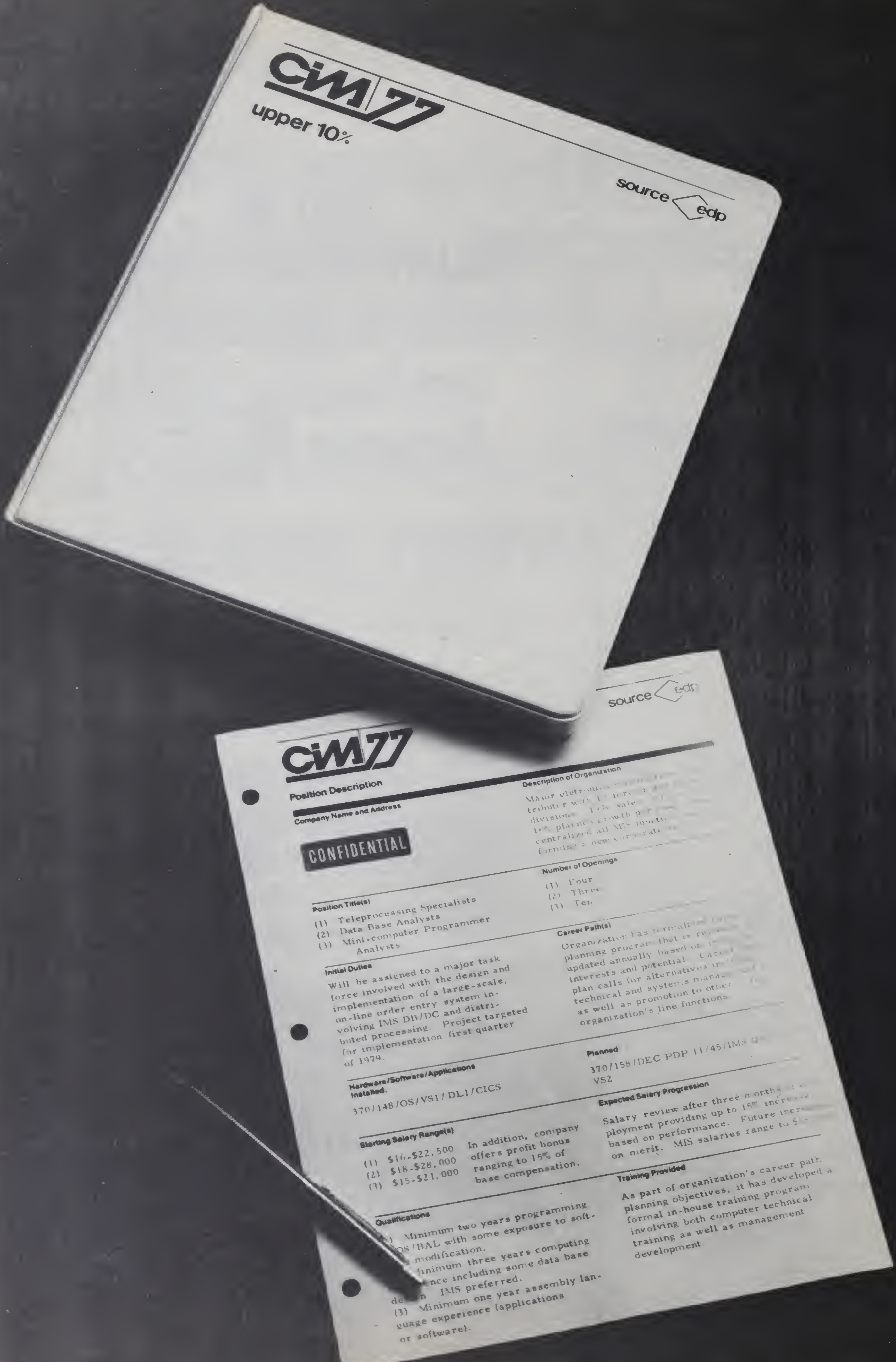

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CiM 77

Position Description

Company Name and Address

CONFIDENTIAL

Description of Organization

Major eletronics [illegible] tributer with [illegible] divisions. [illegible] sales [illegible] planned growth [illegible] centralized all MIS [illegible] forming a new corporate [illegible]

Number of Openings

(1) Four
(2) Three
(3) Ten

Position Title(s)

(1) Teleprocessing Specialists
(2) Data Base Analysts
(3) Mini-computer Programmer Analysts

Career Path(s)

Organization has formalized [illegible] planning program that is re[illegible] updated annually based on [illegible] interests and potential. Career [illegible] plan calls for alternatives in [illegible] technical and systems manag[illegible] as well as promotion to other [illegible] organization's line functions.

Initial Duties

Will be assigned to a major task force involved with the design and implementation of a large-scale, on-line order entry system involving IMS DB/DC and distributed processing. Project targeted for implementation first quarter of 1979.

Planned

370/158/DEC PDP 11/45/IMS [illegible] VS2

Hardware/Software/Applications Installed:

370/148/OS/VS1/DL1/CICS

Expected Salary Progression

Salary review after three months [illegible] ployment providing up to 15% increase based on performance. Future incr[illegible] on merit. MIS salaries range to $[illegible]

Starting Salary Range(s)

(1) $16-$22,500
(2) $18-$28,000
(3) $15-$21,000

In addition, company offers profit bonus ranging to 15% of base compensation.

Training Provided

As part of organization's career path planning objectives, it has developed a formal in-house training program involving both computer technical training as well as management development.

Qualifications

[illegible] Minimum two years programming OS/BAL with some exposure to soft[illegible] modification.
[illegible]inimum three years computing [illegible]nce including some data base de[illegible]n IMS preferred.
(3) Minimum one year assembly language experience (applications or software).

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CIM/77

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CIM/77 is one of the most unique career planning programs ever developed for computer professionals.

CIM/77 participating organizations.

Source Edp has made special arrangements with 527 organizations to participate in our special CIM/77 program. In our judgement, these firms represent the elite in terms of providing hardware/software sophistication, challenging job assignments, personal development programs, rapid advancement potential, favorable working environments and compensation (starting salaries range from $15-$35,000 plus, in some cases, additional bonuses or special performance awards). Those participating in CIM/77 have been drawn from every part of the country. They include computer users in all industries, computer services/consulting firms and computer mainframe and peripherals manufacturers. Their sizes vary from relatively small, rapidly growing firms to some of the nation's most well known and regarded organizations. The total gamut of job content for professionals in programming, systems and software is available with emphasis on opportunities in advanced data base, data communications, distributed processing and new information systems development projects. Many offer formal training programs in both technical and management development. In total, over two thousand positions are available within CIM/77 participants — and you can confidentially evaluate each and every one.

One call or visit to Source Edp gives you inside information on the nation's top 10% and where you might fit in.

Here's how CIM/77 works.

CIM/77 company participants have worked closely with Source Edp to develop detailed job descriptions covering all of their planned openings for November, 1977. Each description reviews initial assignments and qualifications desired, indicates your likely career path (or in many instances multiple career paths), how long it might be expected to reach your goals, the kinds of assistance in the form of training and exposure provided, a complete synopsis of all planned hardware, software and applications and compensation levels at each step along the way. These descriptions involving all 527 CIM/77 participants are available for your perusal at each of Source Edp's 34 branch offices in North America. If you qualify as outlined below, you may review them at your convenience between now and November 30, 1977. (Even if you don't reside in a Source Edp based city, we'll be happy to provide you with this information by telephone). By participating in CIM/77 you'll be able to learn what the computer job market is really like and compare your current position with thousands of others on a local and national basis. And, if you find unique situations that better suit your career objectives, Source Edp is in a position to make discreet contact and follow-up for you. Of course, there is no charge to you since our clients assume all of our fees and other expenses.

Who should participate in CIM/77?

CIM/77 has been specifically designed for computer professionals having at least one to seven years of experience in programming, software, systems development and/or marketing support ranging upward in responsibility to project management. More importantly, the CIM/77 program will have greatest benefit to those professionals who are truly concerned with maximizing their career potential, desire the broadest possible exposure and seek the challenge of rapid advancement.

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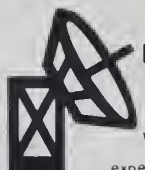

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If you're looking for a career that will let you make the most of your talents, investigate these positions with Digital. Forward your resume, outlining salary history and requirements to Mary Ann Joyce, Digital Equipment Corporation, Dept. H1017 3807, 129 Parker Street, Maynard, Massachusetts 01754.

Course Developers

Responsible for providing technical training to Digital customers and employees, the Educational Service group is seeking professionals with a solid technical knowledge and a desire to teach or develop a broad range of advanced software instructional course material required for the support of both current and future products.

If you have a background in Systems Analysis, Systems Programming, Operating Systems Support, Data Base Management, or Software Course Development and Teaching, we would like you to consider this unique opportunity to broaden your technical background while communicating your expertise.

You'll be involved in the following areas of technology:

- Data Base Management
- Data Communications

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At Digital, service is a major business. Commitment to providing excellent service makes this a key group. We provide highly qualified technical expertise to assist the Field Software Service Organization in the solution of both product-oriented and customer-oriented software problems.

The Large Computer Group of Software Services is responsible for providing this world wide support to DECsystem 10 and DECSYSTEM 20 products. We're currently seeking software professionals who like the satisfaction of problem-solving and desire extensive hands-on computer experience.

We're specifically looking for talented professionals with experience in DECsystem 10 monitors or DECSYSTEM 20 language products and also have opportunities for individuals experienced in one or more of the following:

- customer or vendor software support
- systems programming (including a solid knowledge of operating systems, compilers, or device drivers)
- installation, test and start-up of software packages
- Operating Systems (TOPS-10, TOPS-20, TENEX, NOS, KRONOS, GECOS III, CMS, MCP, VMOS)
- Languages (COBOL, FORTRAN, BASIC, MACRO-10, MACRO-20)
- BLISS or comparable implementation languages

To investigate these opportunities, forward your resume outlining salary history and requirements to Dale Welch, Digital Equipment Corporation, Dept. H1017 3807, 129 Parker Street, Maynard, Massachusetts 01754.

Positions are located at both Digital's Corporate Headquarters in Maynard, Massachusetts and in Marlboro, Massachusetts, residential communities approximately 25 miles away from Boston and convenient to the educational, cultural, and recreational resources of New England. We are an equal opportunity employer m/f.

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SENIOR SYSTEMS PROGRAMMERS AND ANALYSTS

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SENIOR SYSTEMS PROGRAMMER

Must be experienced in systems support of the B-6700 computer and be eager to learn other systems on site. Major effort includes support of:

- * B-6700 Multi processor system
- * Data communications network
- * Large on-line data base using DMS II

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Bachelor's Degree with 3-5 years of advanced systems design and programming experience with the following background:

- * COBOL, ALGOL and/or PL/1 desirable
- * Data base and on-line systems experience
- * Experience in financial retailing or manufacturing industry

These positions offer excellent benefits, professional growth, relocation assistance and the recreational and cultural advantages of our midwestern lifestyle. For prompt and confidential consideration, send resume and salary history to:

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Include current salary

Staff Assistant Systems Programmer

Under the general supervision of the Manager for Systems Software, the Systems Programmer will perform supporting functions for the Cyber 74 NOS system. Successful applicant may also be involved in communications software and evaluation and implementation of graphics equipment and software. Bachelor's degree required. Salary commensurate with qualifications and experience. Please contact Charles D. Lyman, University Computing Center, University of Massachusetts, Amherst, MA 01003. An Affirmative Action/Equal Opportunity Employer.

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Continuous 100% quota performers in medium and/or large scale computer systems. Track runners with CDC, Univac, Honeywell, DEC or other medium to large scale manufacturers are welcome.

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Will support field installations and must have large or medium CPU and peripheral experience. CDC, Univac or other large mainframers are welcome.

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Positions available for hardware technical writers with programming experience or software development technical writers with appropriate programming skills as well as writing capabilities.

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If you are a data processing professional and feel that you would like to make a change with a fast growing Fortune 500 company such as Harris, we would appreciate your taking the time to complete and clip out the information requested below. This will be held in the strictest confidence.

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ADDRESS ____________________

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___ Enclosed is my personal resume for your convenience.

Attn: W.D. Taylor, Manager of Employment, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Fort Lauderdale, Florida 33309.

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We seek highly motivated marketing professionals who are used to being on quota and exceeding it, capable of developing new accounts and maintaining executive relationships with current accounts. You will need a minimum of 3 years sales experience in display terminals, data processing electronics or word processing equipment, have a proven sales record and be self-motivated. This is a sales opportunity leading to future marketing management.

Openings exist in the following cities: Atlanta, Boston, Chicago, Denver, Detroit, Kansas City, New York City, Pittsburgh and Washington, D.C.

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Heavy systems design and implementation background required. Responsibility in many different product areas is possible. Based on experience and interest. Persons with a background in the following will be considered. IBM terminal hardware and software (3270, 3790); point-of-sale systems; Intel 8080; Zilog Z80 microprocessors; data entry systems; intelligent terminal systems.

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The successful candidate will have 15-20 years of commercial product design experience, preferably in computer related equipment. Must have recent experience in the design of foam, compression and injection molded plastic parts. Responsibilities will include original design and documentation and liaison with engineering, manufacturing and outside vendors.

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These positions require technical school or military electronics traning combined with a minimum of one year as a Field Service Engineer preferably in mainframe mini-computers, display terminals or point-of-sale terminals. These positions are located in many areas of the continental United States. Please state area preference in your cover letter.

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You will be responsible for the comprehensive evaluation and analysis of company financial results, plans, forecasts and estimates plus coordinating the development and consolidation of same. In addition you will recommend operational and investment financial measures to management and implement approved programs while providing financial counsel and liaison to department heads as required. The person we seek will have 8 to 10 years experience in accounting and financial planning and analysis with a minimum of 3 years experience in management. An MBA with emphasis in finance and/or accounting and a computer industry background is desirable.

We offer excellent benefits package and salaries commensurate with experience. Principals, for prompt response, please send a resume indicating: (1) the position of interest, (2) current salary, and (3) salary expectations to:

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- Vocationally oriented to the Retail Market
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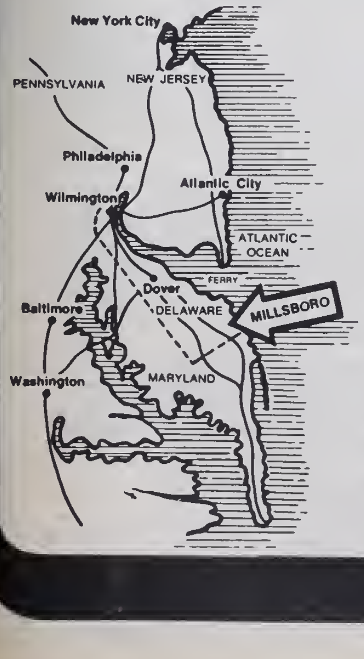

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Opportunities exist in California, Virginia, New York, Kansas and Pennsylvania. How do you find out which career opportunities are available in your preferred geographic area? We make it easy. We've established two "clearing houses." Send your resume with salary history and indicating the geographical area of your preference to either of the following:

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Candidates should have a minimum of a Bachelor's degree, at least two years experience as a systems programmer on a general purpose time-sharing computer, fluency in high level and assembler languages, experience in the assembly and programming of microcomputers, and be able to relate effectively to users in an academic environment.

Starting salary is $12,750 - $16,887 commensurate experience and qualifications. A letter of application and complete resume should be sent, by Oct. 31, 1977, to: ACADEMIC

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While preferred qualifications include a degree, our prime interest is capability as demonstrated by experience in large-scale computer systems programming/analysis. Exposure to time-sharing and remote job processing is desirable. Specific applications in computer aided design or material and production control are currently available.

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is undertaking the development of a series of large scale, state-of-the-art information systems. A number of opportunities are being created for individuals who possess outstanding breadth, coupled with technical and managerial excellence. If you combine imagination, enthusiasm, professional training and experience and wish to express these in an environment where you can enjoy the freedom to excel, Federal Express offers the following opportunities in the Information Systems Division.

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Responsible for the implementation and operation of multiple computer centers in diverse locations. Multiple vendor environment. We prefer strong business background coupled with good personnel and communications skills. This position offers major participation in planning activities.

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Primary responsibility is the development of applications, encompassing real-time, on-line and batch systems in a multiple vendor environment. Emphasis is placed upon managerial and personnel skills and the ability to develop further an already effective and creative staff.

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(315) 422-5111

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Our rapidly growing Information Systems Department has several openings for programmers/analysts who are self-motivated, results-oriented professionals with a proven record of accomplishment. You may qualify for one of these positions if you have at least 3-5 years experience designing and implementing material or financial applications on medium to large scale computers (IBM 145 upwards), a knowledge of COBOL and DOS/OS-JCL, and experience using structured programming techniques. Experience with on-line data base management systems would be a plus.

If, in addition to required experience, your educational preparation includes a degree (MBA desired) you may well be the candidate we are seeking. We would appreciate the opportunity to review your resume. Please include salary history and expectations.

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Both positions require experience in ANS COBOL on IBM 370/DOS or OS. SYSTEMS ANALYSTS must have good design background in areas such as: billing, inventory control, sales accounting and analysis. Frequent user interface necessary. PROGRAMMERS experienced in these areas preferable.

PROGRAMMER

Requires experience in COBOL in 370/DOS or OS environment and at least one year DL/1 in the following: coding, writing DBD & PSB, and preparing both data base file notes with prefix resolutions and VSAM defines and deletes. Also desirable: applications experience in manufacturaing and accounting — especially cost — and background with FORTRAN IV on Hewlett-Packard equipment.

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Applicants should have at least four years experience in the data processing industry, including two years meeting customer needs through the sale and marketing of computer services using IBM System/360 or 370 computers. In addition, knowledge of Accounting Systems, Human Resource Systems, or Data Base Management applications is desired.

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Send your resume, salary history and requirements, in confidence, to: L. Plitt, Manager, V.S. Programs, General Electric Company, Information Services Division, 401 North Washington Street, Rockville, Maryland 20850. An Equal Opportunity Employer M/F.

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M.S. or PhD in Math, Physics, Computer Science, or Engineering, and experience in analysis of engineering systems.

Programmers

B.S. in Computer Science, Math, Physics, or Engineering and programming experience with higher order languages such as Fortran, Pascal or PL/I. Both scientific and real-time programmers are required.

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M.S. or PhD in Computer Science and three years experience in development of programming languages, compilers, translators, assemblers and link editors.

Send your resume in confidence to.
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WANG's dynamic growth has created the need for an Applications Specialist who is well versed in any one of WANG's Human Resource Management Systems (payroll - personnel - pension). This individual should possess strong communications skills as this position requires constant contact with our clients. The main responsibilities include travelling to client sites for the purpose of training and consulting on the implementation of WANG software systems.

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data processing

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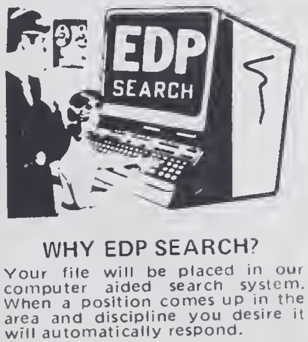

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If you feel you possess the background to join a successful professional team and desire an atmosphere of challenge in a growing MIS operation, please send your resume with salary requirements to:

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UOP Inc., a leading multi-national company in the energy and environmental field is searching for a top flight Systems Programmer with MVS background to join the present staff. We are installing an IBM/163-3 in October. This is an exciting opportunity to work with the latest software (MVS, TSO and IMS) and to become a member of a truly professional staff of Software Programmers. We offer attractive salary and full benefits package. Send resume including salary requirements to Barbara Gardner.

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Start at $25K

The IBM Technology Division of the County of Los Angeles' Data Processing Department, located in Downey, is seeking a Systems Programming Manager to head up the Operating Systems Section. Responsibilities include maintenance of the Operating System (MVS), TSO and system measurement facilities (SMF, RMF).

The position requires a minimum of three years IBM 370 series systems programming experience within the last three years, one year of which must have been in a highly responsible or supervisory capacity.

The Los Angeles County IBM facility consists of four IBM 158 computers operating in a Batch/RJE/TP environment. Major software components are MVS, TSO, IMS, FASTER and TCAM. Current plans include VTAM, NCP, 3350's and 158 APs.

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Data Processing Department
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These are immediate openings with a small systems group, a high technology division responsible for the development and manufacture of business minicomputers, terminal systems and encoding equipment.

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COMPUTER PERFORMANCE ANALYSIS

The University of California's Los Alamos Scientific Laboratory, a multi-program research organization, is seeking professionals with interest and experience in computer performance measurement, modeling, and analysis. Our Computer Science and Services division manages one of the world's most advanced computer complexes, which inclues a CRAY-1 computer, four CDC 7600's, two CDC Cyber 73's, and IBM 370/148, and numerous minicomputers, all operating in a network environment. Operating systems include CDC NOS, the Livermore Time-Sharing System (LTSS), and Bell Laboratories' UNIX. A high-performance operating system for the CRAY-1 is now being developed.

OPPORTUNITY #1

Requires a PhD in computer science or a related area and experience in the performance analysis of operating systems. Experience in one or more of the following areas is desirable: systems programming, computer architecture, distributed computing, or networking. A highly motivated individual will have the opportunity to propose and lead innovative projects in computer performance. Publication of research results is expected.

OPPORTUNITY #2

Requires a B.S. or M.S. in computer science or a related area with experience in development of computer performance measurement systems, performance modeling, and operating systems. In addition, experience in computer architecture, distributed computing, or networking is desirable. This individual will have the opportunity to develop both hardware and software performance monitors and to conduct performance analyses of operating systems and local network.

The Laboratory, located in the beautiful mountains of northern New Mexico, offers excellent working conditions and fringe benefits, such as 24 days' annual vacation, ample sick leave, and a progressive retirement plan. Los Alamos offers such advantages as uncrowded, casual living; a pollution-free environment with abundant recreational opportunities, and an excellent school system.

PLEASE SEND COMPLETE RESUME WITH SALARY REQUIREMENTS, IN CONFIDENCE, TO:

Charles Mikkelson, Employment Representative
DIV. 77-BI
Los Alamos Scientific Laboratory
P.O. Box 1663
Los Alamos, New Mexico 87545

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Mechanical/Ocean Systems Engineers - to be involved in Ocean Research. Experience in any of the following areas: mechanical, electro-mechanical, hydrological, marine, fluid mechanics/dynamics.

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Along with choice locations, CSC offers you competitive salaries and a fully paid company benefits package.

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San Francisco, California 94111

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Syracuse, New York 13206

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Scientific Programming

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EMR is located on Florida's Gulf Coast. If you would like the chance to join a growth oriented company, please send your resume, including salary requirement:

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Attn: Phil Casesa
EMR Telemetry
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Sarasota, Fla. 33578
(813) 371-0811

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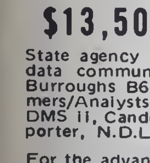

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SYSTEMS PROGRAMMER

experienced in FORTRAN, COBOL, RPG, multi-user applications and JCL for IBM 360/75 and IBM 370/148 systems. Qualifications: bachelor's degree in computer science or equivalent experience. Apply by Oct., 1977, to: Personnel Office, Parkersburg Community College, Rt. 5, Box 167-A, Parkersburg, W. Va. 26101. An Affirmative Action/ Equal Employment Opportunity Employer.

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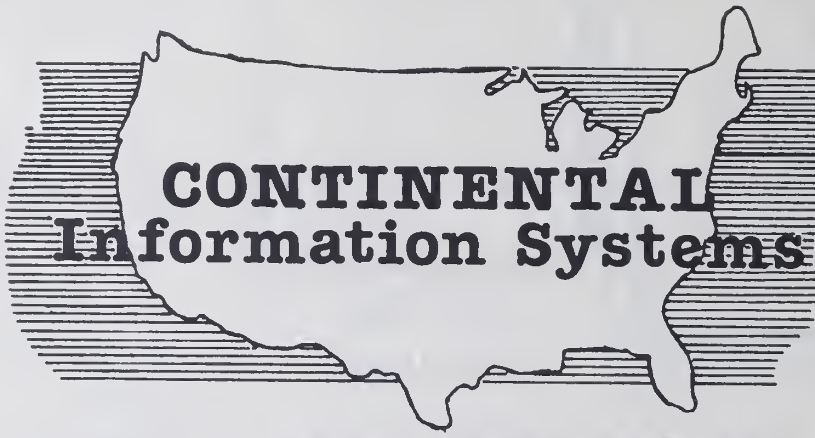

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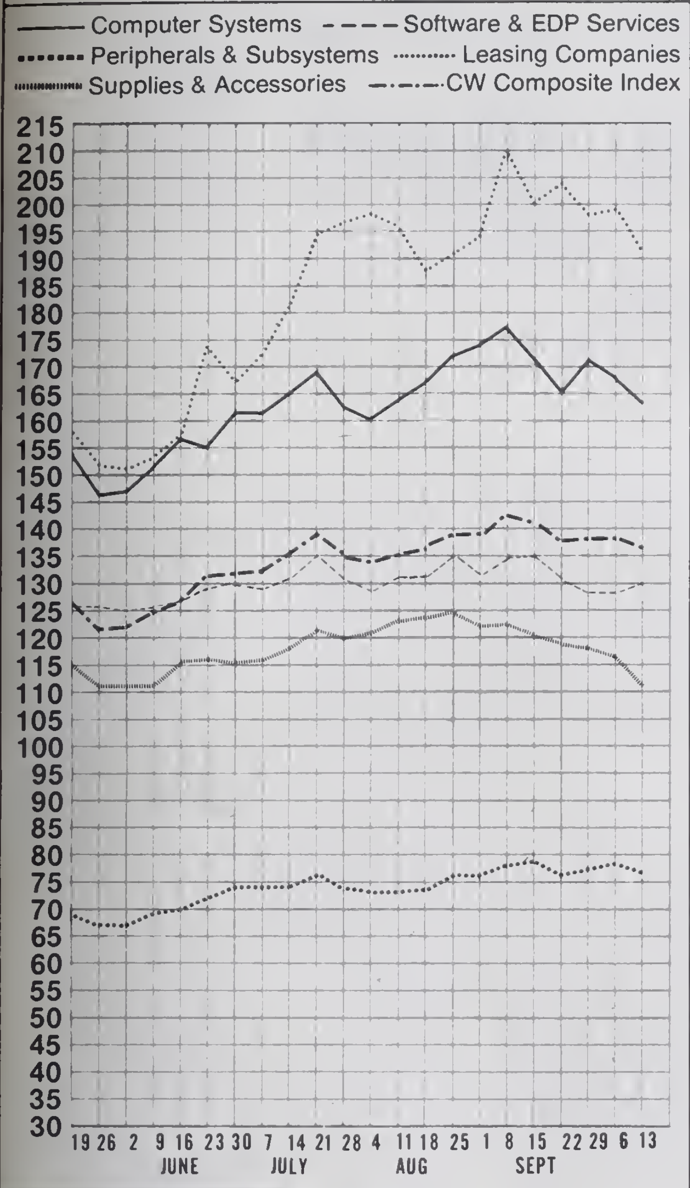

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Earnings	826,302	538,043

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Tax Cred	.....	835,000
Earnings	2,802,000	2,287,000
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Tax Cred	.....	1,350,000
Earnings	4,370,000	3,094,000

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1. Title of publication: Computerworld
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I certify that the statements made by me above are correct and complete.

W. Walter Boyd
President

TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 12, 1977

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE OCT 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMOAHL CORP	22- 44	41 1/2	+2	+5.0
N	8URROUGHS CORP	55- 91	65 5/8	-2 3/4	-4.0
O	COMPUTER AUTOMATION	18- 30	23 1/8	- 1/8	-0.5
N	CONTROL OATA CORP	20- 26	21 1/8	- 1/8	-0.5
C	CRAY RESEARCH INC	15- 29	23 1/2	- 1/2	-2.0
N	OATA GENERAL CORP	35- 51	44 1/2	-1 3/4	-3.7
N	OATAPCINT CORP	18- 32	29 1/8	- 1/4	-0.8
N	OIGITAL EQUIPMENT	37- 53	44 7/8	-1 5/8	-3.4
N	ELECTRONIC ASSOC.	2- 3	1 3/4	- 1/8	-6.6
A	ELECTRONIC ENGINEER.	8- 11	9 1/2	- 1/2	-5.0
O	FOUR-PHASE SYSTEMS	13- 19	16 7/8	- 7/8	-4.9
N	FCX8ORO	42- 54	46 1/4	+ 1/2	+1.0
O	GENERAL AUTOMATION	6- 9	6 3/8	- 1/2	-7.2
O	GRI COMPUTER CORP	1- 1	3/8	- 1/8	-25.0
N	HEWLETT-PACKARO CO	69- 87	74 3/4	-1 1/4	-1.6
N	HONEYWELL INC	44- 55	44	- 7/8	-1.9
N	I8M	245-286	255 1/4	-2 1/8	-0.8
O	MANAGEMENT ASSIST	5- 9	7 1/4	- 3/8	-4.9
O	MEMOREX	23- 34	30 7/8	+1 1/8	+3.7
O	MICROOATA CORP	7- 18	11 7/8	-1 1/4	-9.5
C	MOOULAR COMPUTER SYS	5- 8	6 1/2	+ 1/8	+1.9
N	NCR	32- 47	45 1/8	- 7/8	-1.9
O	PRIME COMPUTER INC	12- 23	19 5/8	-1	-4.8
N	PERKIN-ELMER	17- 22	19 1/8	- 7/8	-4.3
N	RAYTHEON CO	16- 33	29 3/4	- 3/4	-2.4
N	SPERRY RANO	32- 42	31 7/8	- 5/8	-1.9
O	SYCOR INC	8- 15	11 5/8	+ 1/8	+1.0
A	SYSTEMS ENG. LA8S	5- 8	6 7/8	+ 1/2	+7.8
A	WANG LA8S.	10- 14	12	- 3/8	-3.0

LEASING COMPANIES

EXCH		PRICE 1977 RANGE (1)	CLOSE OCT 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 5	4 5/8	- 1/8	-2.6
C	8OOTHE COURIER CORP	8- 10	10	- 1/4	-2.4
O	CCMOISCO INC	10- 13	12	- 1/4	-2.0
A	COMMERCE GROUP CORP	1- 3	1 1/4	0	0.0
A	CCMPUTER INVSTRS GRP	1- 2	7/8	- 1/8	-12.5
M	OATRONIC RENTAL	0- 2	1 1/8	0	0.0
A	OCL INC	1- 2	2	- 1/8	-5.8
N	OPF INC	6- 9	8 5/8	- 3/4	-8.0
N	ITEL	13- 22	18 7/8	-1 1/8	-5.6
N	LEASCO CORP	19- 27	23 5/8	- 1/8	-0.5
O	LEASPAC CORP	1- 2	1 1/4	0	0.0
C	NRG INC	1- 1	1/8	0	0.0
A	PIONEER TEX CORP	5- 11	5 3/8	- 1/8	-2.2
N	U.S. LEASING	10- 15	12 1/2	- 7/8	-6.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-EALT-WASH
L=NATIONAL; M=MIDWEST; C=OVER-THE-COUNTER
O-T-C PRICES ARE 8IO PRICES AS OF 3 P.M. OR LAST EIO
(1) TC NEAREST OCLLAR

SOFTWARE & EOP SERVICES

EXCH		PRICE 1977 RANGE (1)	CLOSE OCT 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	1- 2	5/8	+ 1/8	+25.0
O	ANACOMP INC	7- 10	8 5/8	+ 1/8	+1.4
A	APPLIEO OATA RES.	5- 10	8 1/8	+ 3/8	+4.8
N	AUTOMATIC OATA PROC	23- 30	25 1/2	- 1/4	-0.9
O	COLEMAN AMERICAN COS	2- 2	1 7/8	0	0.0
O	COMPU-SERV NETWORK	9- 15	9 1/2	-1 1/2	-13.6
O	COMP ELECTION SYSTMS	6- 10	9 1/2	+ 1/2	+5.5
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
O	COMPUTER NETWORK	6- 11	9 3/4	- 1/8	-1.2
N	COMPUTER SCIENCES	7- 9	8 1/2	- 1/8	-1.4
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	1- 3	1 3/8	0	0.0
O	COMSHARE	5- 8	7	- 1/4	-3.4
O	OATA OIMENSIONS INC	3- 5	3 1/8	0	0.0
O	OATATA8	1- 2	1 3/8	0	0.0
N	ELECTRONIC OATA SYS.	15- 20	15 3/8	- 1/2	-3.1
O	INSYTE CORP	2- 3	1 3/4	0	0.0
O	IPS COMPUTER MARKET.	1- 2	1 5/8	0	0.0
O	KEANE ASSOCIATES	3- 4	4 1/2	+ 1/4	+5.8
O	KEYOATA CORP	2- 3	1 3/4	0	0.0
A	LOGICON	7- 17	11 3/8	- 1/8	-1.0
A	MANAGEMENT OATA	1- 2	1 3/8	0	0.0
A	NATIONAL CSS INC	19- 27	24 3/4	-2	-7.4
O	NATIONAL OATA CORP	4- 7	6 5/8	- 1/2	-7.0
A	ON LINE SYSTEMS INC	16- 22	16	- 7/8	-5.1
N	PLANNING RESEARCH	3- 6	4 7/8	+ 1/8	+2.6
O	PROGRAMMING & SYS	1- 1	3/8	+ 1/8	+50.0
O	RAPIOATA INC	2- 3	2 1/4	+ 1/8	+5.8
O	REYNOLOS & REYNOLO	17- 20	18 3/4	- 1/4	-1.3
O	SCIENTIFIC COMPUTERS	1- 4	4	- 1/8	-3.0
O	TYMSHARE INC	14- 23	19 1/8	-1	-4.9
A	URS SYSTEMS	4- 5	4 5/8	+ 1/8	+2.7
N	WYLY CORP	1- 2	3/4	-	-7.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE OCT 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOORESSOGRAPH-MULT	10- 15	13 1/8	-1	-7.0
O	AOVANCEO MEMORY SYS	7- 9	6 5/8	- 1/4	-3.6
N	AMPEX CORP	8- 11	9 1/2	- 1/2	-5.0
O	ANOERSON JACO8SON	3- 5	4	+ 1/4	+6.6
N	APPLIEO OIG OATA SYS	10- 20	14 3/8	+ 1/8	+0.8
O	8EEHIVE INT'L	8- 12	9 1/2	- 3/8	-3.7
A	8OLT,8ERANEK & NEW	7- 9	8 1/8	- 1/2	-5.7
N	8UNKER-RAMO	8- 12	10 3/8	- 1/2	-4.5
A	CALCOMP	3- 5	3 3/8	+ 3/8	+12.5
O	CAM8RIOGE MEMORIES	1- 4	3 1/4	-	-1.8
N	CENTRONICS OATA COMP	22- 30	21 1/2	-1 3/8	-6.0
C	COGNITRONICS	1- 1	3/4	0	0.0
O	COMPUTER COMMUN.	5- 8	6 3/4	- 1/8	-1.8
O	COMPUTER CONSOLES	4- 7	4	0	0.0
A	COMPUTER EQUIPMENT	2- 3	3	+ 1/8	+4.3
O	COMPUTER TRANSCEIVER	1- 1	1 3/8	0	0.0
C	COMTEN	9- 13	10 3/4	+ 1/2	+4.8
N	CONRAC CORP	19- 28	20 1/4	- 3/4	-3.5
O	OATA ACCESS SYSTEMS	4- 5	3 3/4	0	0.0
O	OATA 100	6- 9	7 1/2	+ 1/2	+7.1
A	OATA PROOUCTS CORP	9- 17	15 3/8	+ 3/8	+2.5
O	OATA TECHNOLOGY	3- 4	4 1/4	+ 1/4	+6.2
O	OATUM INC	1- 2	1 3/4	- 1/4	-12.5
O	OECISION OATA COMPUT	2- 3	2	- 1/4	-11.1
O	OELTA OATA SYSTEMS	1- 1	3/8	0	0.0
A	OOCUMATION INC	6- 9	7 1/2	+ 1/2	+7.1
O	OATARAM CORP	2- 12	11 3/4	+1 1/2	+14.6
N	ELECTRONIC M & M	4- 5	3 7/8	- 1/4	-6.0
O	FA8RI-TEK	1- 2	1 1/4	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1	0	0.0
N	HAZELTINE CORP	8- 12	8 3/8	0	0.0
N	HARRIS CORP	28- 39	38 1/2	+ 1/2	+1.3
A	INCOTERM CORP	10- 16	15 3/4	+2	+14.5
O	INFOREX INC	4- 7	4 5/8	- 1/4	-5.1
O	INFORMATION INTL INC	9- 14	11	0	0.0
O	INTEL CORP	38- 57	45	-3	-6.2
A	LUNOY ELECTRONICS	3- 6	4 7/8	+ 3/8	+8.3
O	MSI OATA CORP	6- 13	12 1/4	+ 1/4	+2.0
N	MOHAWK OATA SCI	5- 8	5 7/8	0	0.0
O	PENRIL CORP	2- 5	3 7/8	- 1/4	-6.0
A	PERTEC CORP	7- 9	8 5/8	+ 1/8	+1.4
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	3 5/8	- 1/8	-3.3
O	RECOGNITION EOUIP	6- 10	7 3/8	- 1/8	-1.6
O	SCAN OATA	1- 2	1	- 1/8	-11.1
O	STORAGE TECHNOLOGY	10- 18	15 7/8	- 3/4	-4.5
O	T 8AR INC	7- 13	12 1/2	- 1/4	-1.9
O	TALLY CORP.	4- 6	3 3/4	- 3/8	-9.0
A	TEC INC	7- 10	7 5/8	+ 3/8	+5.1
N	TEKTRONIX INC	29- 38	37 1/4	0	0.0
N	TELEX	2- 3	2 3/8	- 1/8	-5.0
O	WILTEK INC	1- 1	3/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977 RANGE (1)	CLOSE OCT 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN 8US PROOS	6- 8	6 1/8	- 1/8	-2.0
O	8ALTIMORE 8US FORMS	1- 4	1 3/8	- 1/8	-8.3
A	8ARRY WRIGHT	10- 14	12 1/2	- 5/8	-4.7
O	CY8ERMATICS INC	1- 1	7/8	0	0.0
O	OUPLEX PROOUCTS INC	14- 19	17 1/2	+ 1/8	+0.7
N	ENNIS 8US. FORMS	6- 7	5 7/8	- 1/4	-4.0
C	GRAHAM MAGNETICS	11- 17	17	0	0.0
O	GRAPHIC CONTROLS	13- 18	12 3/4	-1 1/2	-10.5
N	3M COMPANY	48- 56	49 3/4	- 5/8	-1.2
C	MOORE CORP LTO	26- 37	25 7/8	- 3/8	-1.4
N	NASHUA CORP	16- 28	19 1/2	+ 1/2	+2.6
O	STANOARO REGISTER	18- 25	20 3/4	+1	+5.0
O	TA8 PROOUCTS CO	10- 19	10 1/4	-5 1/2	-34.9
N	UARCO	19- 22	18 1/2	-1 3/8	-6.9
A	WA8ASH MAGNETICS	10- 15	12 1/4	+ 1/4	+2.0
N	WALLACE 8US FORMS	17- 21	16 1/4	+ 1/8	+0.6

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